Educational Leadership

FEBRUARY 1961

JOURNAL OF
THE ASSOCIATION
FOR SUPERVISION
AND CURRICULUM
DEVELOPMENT, NEA

DETROIT PUBLIC LIBRARY
FEB 14 1961
PHILOSOPHY, RELIGION & EDUCATION

THEME:
Teaching Methods and Devices

ASCD Headquarters Staff

Executive Secretary, MARGARET GILL
Associate Secretary; Editor, ASCD Publications, ROBERT R. LEEPER
Administrative Assistant, VIRGINIA BERTHY
Staff Assistants, SARAH ARLINGTON, NANCY CHILDS, RUTH P. ELY, RUBY J. FUNKHOUSER, FRANCIS MINDEL, DOLORES MINOR, CONSTANCE R. REINHARDT, JOAN SPARGUR, NANCY J. SUITT, RUTH N. TYLER, JUANITA E. WHITE, BETTY WOODFOLK.

Executive Committee

President, ARTHUR W. FOSHAY, Exec. Off., Horace Mann-Lincoln Inst. of Sch. Experimentation, Tchrs. Coll., Columbia Univ., N. Y.
President-Elect, WILLIAM VAN TIL, Prof. and Chair., Dept. of Secondary Ed., New York University, New York, N. Y.
Vice-President, WILLIAM M. ALEXANDER, Chair., Dept. of Ed., George Peabody Coll. for Tchrs., Nashville, Tenn.
CHESTER BABCOCK, Exec. Dir., Dept. of Curric. and Instr., Seattle Public Schs., Seattle, Wash.
LAVONE HANNA, Prof. of Ed., San Francisco St. Coll., San Francisco, Calif.
MARCELLA R. LAWLER, Prof. of Ed., Tchrs. Coll., Columbia Univ., New York, N. Y.
LILLIAN C. PAUKNER, Dir. of Curric., Milwaukee Pub. Schs., Milwaukee, Wis.

Publications Committee

GALEN SAYLOR, *Chairman,* University of Nebraska, Lincoln (1961) (Region XI)
FRED T. WILHELMS, *Chairman-Elect,* San Francisco State College, California (1963)
WILLARD ABRAHAM, Arizona State College, Tempe (1961) (Region XII)
LESLEE J. BISHOP, Public Schools, Livonia, Michigan (1961)
ELIZABETH BRADY, San Fernando Valley State College, Northridge, California (1962)
ALMA BROWN, Public Schools, Overland Park, Kansas (1962)
J. P. CAUSEY, Montgomery County Board of Education, Rockville, Maryland (1963) (Region III)
MORGAN E. EVANS, Public Schools, Galveston, Texas (1963)
MELVIN W. FARLEY, University of Idaho, Moscow (1963)
ALICE H. HAYDEN, University of Washington, Seattle (1962) (Region X)
ELSIE HAYES, Public Schools, Fairfax County, Virginia (1961)
HELEN M. JONES, Oklahoma State University, Stillwater, Oklahoma (1963) (Region VIII)
THOMAS R. LANDRY, Louisiana State University, Baton Rouge, Louisiana (1962)
FRANCES R. LINK, Cheltenham Township School District, Elkins Park, Pennsylvania (1962) (Region II)
JOHN P. MCINTYRE, State Department of Education, Tallahassee, Florida (1962) (Region IV)
JOHN JULIA MCMAHAN, New Mexico State University, University Park (1963) (Region IX)
DOROTHY OLDENDORF, Public Schools, Wilmette, Illinois (1961) (Region V)
ARTHUR R. OLSON, Public Schools, Denver, Colorado (1961)
ETHEL OYAN, Public Schools, Sioux Falls, South Dakota (1963) (Region VI)
KARLENE V. RUSSELL, State Department of Education, Montpelier, Vermont (1962) (Region I)
MARGARET WASSON, Highland Park Public Schools, Dallas, Texas (1963)
ARTHUR W. FOSHAY, *ex officio,* President, Association for Supervision and Curriculum Development, NEA

Educational Leadership

JOURNAL OF THE
ASSOCIATION FOR SUPERVISION AND
CURRICULUM DEVELOPMENT, NEA
VOL. 18, NO. 5 FEBRUARY 1961

Editor, ROBERT R. LEEPER
Editorial Assistant, RUTH P. ELY
Advertising Manager, RUTH N. TYLER
Circulation Manager, FRANCES MINDEL

Teaching Methods and Devices

Articles

On the theme

More Opportunity for Learning—or Less?	*Alexander Frazier*	266
Teaching Machines and Auto-Instructional Programs	*A. A. Lumsdaine*	271
Teaching Machines and the Learning Process	*Herbert J. Klausmeier* and *Philip Lambert*	278
Technology and Purpose in Teaching	*O. L. Davis, Jr.*	284
Future Classroom—An Educational Automat?	*William C. Kvaraceus*	288
Laboratories for Foreign Language Teaching	*Milton L. Shane* and *Helen Lacy Shane*	293

In general

Problem Solving as Teaching Method	*Henry J. Hermanowicz*	299

Departments

The Importance of People	*Prudence Bostwick* *Nora Weckler*	307
Curriculum Developments	*Arthur Hoppe*	315
Letters to the Editor	*Arthur Adkins*	325
Significant Books	*Elizabeth Z. Howard* *Margaret Wasson, Marian Jenkins*	329

Cover photograph courtesy Jules Rosenthal, Madison, Wisconsin, Public Schools

EDUCATIONAL PRESS ASSOCIATION OF AMERICA

The Association for Supervision and Curriculum Development seeks to provide an open forum for the free expression of competent opinion relating to its area of interest. The materials herein printed are the expressions of the writers and not a statement of policy of the Association unless set by resolution.

EDUCATIONAL LEADERSHIP is published monthly, October through May, by the Association for Supervision and Curriculum Development, National Education Association, 1201 Sixteenth Street, N.W., Washington 6, D. C. Subscription price, $4.50 a year. Single copies, 75 cents. Association membership with subscription and yearbook, $8 a year. Member of the Educational Press Association of America. Contents listed in *Education Index.* No remuneration is offered for contributions. Second class postage paid at Washington, D. C. EDUCATIONAL LEADERSHIP is printed by Judd & Detweiler, Inc., Washington D. C.

Copyright 1961 by the Association for Supervision and Curriculum Development, NEA.

Alexander Frazier

A key question about innovations:

More Opportunity for Learning— or Less?

A GOOD many innovations today are being promoted on the grounds that they make better provisions for individualized instruction. Such claims cause us to listen. Greater freedom for the learner is something to which we are deeply committed; it is something about which we may well need to be, and indeed are, newly concerned.

Any such proposal, then, should receive a fair hearing. It should also be studied closely for what is meant by individualized instruction. To do this, we need to be sure of what we mean by that term. Otherwise, we may reject an idea of merit, perhaps out of distaste for its present context. Or we may waste time on the further exploration of long since abandoned byways.

Although we may try to sharpen our definition of individualized instruction in various ways, basically we must relate any proposal toward that end to our conception of what a good program looks like. Our understanding of the many dimensions of human variability, our insights into the variety of purposes for and paths to learning, our appreciation of the value of multiple resources for learning—all are so interwoven in our idea of a good program that we may find it hard to define individualized instruction apart from this total context.

Perhaps we can agree that characteristic of any provision seriously proposed as promising greater success in personalizing learning should be its orientation toward opening up the fullest possible range and richness of learning for all individuals. Among our current curriculum concerns, probably the one of greatest urgency is just this—that we may have imposed limitations or boundaries on some or on many or perhaps on most learners. Standardized content, closely graded textual materials, group-based measures of achievement, and some of our routine grouping procedures are being reexamined in light of new convictions that we can safely make more room for everybody's learning.

Individualizing Learning

Against this background of concern, we respond immediately to the promise of several current proposals for greater individualization of instruction. For ex-

ample, the movement to individualize the teaching of reading properly excites us. The approach uses what we know about pace. It redeems interest and purpose as central to reading. It also promises to emancipate both learner and teacher from too great dependence on too few materials; it centers on the full use of resources that have often been perceived as "outside" or supplementary to instruction. All this we accept as moving in the direction of making more room for learning.

Of similar promise are the attempts now being made to transcend the limitations we recognize as coming from too closely graded instruction, as in mathematics. Confining children to the mastery of a handful of number facts parceled out in terms of a supposed logic of less to more difficult is being challenged on several counts. Helping children learn to think in terms of relationships and interrelationships is tied to a new concern for learning by wholes. Here, again, the conception of learning really promises to make more room for children to learn whatever they can that will help make increasing sense out of their world.

The attention now being given to new approaches to independent study, particularly at the secondary level, may also seem worth pursuing. We need not accept the total context of some of these ventures. Independent study does not have to be carried on in dark corners nor paid for by mass teaching. We have long valued the provision of opportunities for learners to go it on their own, to learn more than everybody has to know, to find out much that only they want or need to or perhaps can learn. The new emphasis on independent study may cause us to think through again better ways of making sure that personal learning is both valued and supported.

Still another recent development of promise is the seminar. At its best, the seminar provides a setting in which advanced students are freed to investigate problems and topics in terms of individual interests or purposes, with the emphasis on research and experimentation. The general approach, while found most widely at the eleventh and twelfth grades, also characterizes some special provisions for gifted children, usually those offered in late afternoon, Saturday, or summer classes. Hopefully, our assessment of the seminar may enliven our efforts to incorporate more of what we believe about the role of interest, of purpose, and of personal discovery in our program at all levels for all learners.

These innovations, then, may well seem to us to hold promise of promoting greater individualization of instruction. Of course, there are still questions about them we may wish to ask. We need to know that emancipation from the textbook in learning to read is accompanied by continued attention to skill development. We are concerned about what happens to children's immediate needs and experiences in a kind of learning that newly stresses generalizations and structure. We would like to see the independent study movement clarify its thinking on the function of the group in learning and the seminar idea rescued from its tie-in with abler learners only.

In general, however, these developments seem to give real promise of lifting the limitations that may sometimes close in on the learner as an individual. Through the wider use of resources, a new vision of how to escape from the ceilings in graded learning, a new em-

---

Alexander Frazier ***is Director of the Center for School Experimentation, College of Education, The Ohio State University, Columbus.***

phasis on depth studies, and a reemphasis on learning through experimentation, research and personal discovery, we sense in these proposals the desire to perfect a conception of learning and teaching that promises more opportunity for everybody.

Less Opportunity for Learning?

But there is currently another group of proposals for individualizing instruction about which we may be less hopeful. In fact, if we are to clarify what we mean when we talk about better provisions for personal learning, we are going to need to think through very carefully the differences between this second set and those already discussed. As we do, we may find the basic differences come in the narrowness of the program conceived of by these proposals and their reduction of individual variability to one dimension only: rate of learning.

Let us look at some of these proposals briefly. One of them is the team learning idea. In this practice, as most widely described, learners are put together in pairs or trios with the purpose of helping each other move more successfully through the given material to be learned.

We may see in this kind of learning situation something to admire, much, indeed, that we have long sought to provide for in good programs. We know children have a great deal to learn from each other and much to learn that can only be learned together. What is questionable about this method is the conception of what is to be learned. The program envisioned in team learning seems to be a preplanned, prescribed sequence of learnings through which all learners must proceed. Pairing and trio-ing the learners is a device for helping speed them through.

Another rate-centered approach to individualized instruction is found in a variety of attempts to solve the problem of personal learning through regrouping. The Joplin Plan, some variants of the ungraded primary, and some of the team teaching experiments belong to this camp. Again, the program is conceived of as fixed, and children are reshuffled to put them in touch with that segment of it which marks the place in time which they have reached in their contact with the program.

A third new attempt to speed learners through a narrowed sequence of learnings is found in the varied ways being developed to "program" what is to be learned more thoroughly than we have ever been able to, or perhaps cared to, in the past. Whether tied to machines of some kind or not, these efforts all presuppose an identical program for every learner. Again, the only difference among individuals that really matters is how quickly they can move through this program.

What disturbs us in these ventures, then, should rightly disturb us. At what cost do they propose to provide more adequately for individualized instruction? The program is reduced; the individual is diminished.

Contrasts in Approaches

The difference between such narrowed-down, rate-centered proposals and those that most of us see as really promising to enlarge learning for the individual can be highlighted by spelling out how they vary in a few of the usual ways of looking at curriculum and teaching.

Content

A rate-centered approach conceives of content as preselected and preorganized,

the same for all learners. Ideally, it is presentable in highly graded fashion so that everybody can move through it step by step. Emphasis is on information—facts, definitions, fixed relationships, single and "right" answers.

An approach that emphasizes opportunities for the learner conceives of content as created by him. While some learnings will be created in common, many will be unique to the individual. All of what he learns becomes his own, in any context of understanding, but some things only he will be able to OR need to OR want to learn.

Method

In rate-centered learning, with an emphasis on acceptance and retention of content specified in textual material, method is concerned with facilitating the movement through what is to be learned as expeditiously as possible. Opportunities for enlarging on basic understandings tend to be provided terminally and thus go chiefly to the faster learners.

Emphasis on created content involves a method through which learners help in planning experiences and selecting materials for learning. Provision for individual needs gets incorporated in the program from the beginning, being perceived as essential to effective learning for everybody.

Resources

Obviously, under an approach that emphasizes rate, the resources tend to be limited to the textual material.

On the other hand, an emphasis on room for learning will be accompanied by a desire to make use of the full range of resources for learning—textbooks and many other kinds of printed materials, films, recordings, television as appropriate, human resources, study trips, and all the rest.

In brief, under a rate-centered approach to learning, content is seen as fixed, the teacher is seen mainly as an expediter, and resources dwindle to a single text. In the kind of program most of us are supporting, content is seen as created by learners to satisfy many needs and interests (and to stimulate new ones), the teacher as filling many roles, and the resources for learning as virtually boundless.

Lines of Action

The key question, then, is whether proposed innovations for more effective individualization of instruction actually do provide more opportunity for learning. In order to make our judgments on this score more discriminating, as we have pointed out, we have to become increasingly clear about our own conception of learning and teaching. As we do, there are several lines of action open to us for making our clarification count in actual practice.

One is to test proposed innovations on our own terms. So often we see the innovation embedded in its original context and feel that since we cannot accept the context, we would prefer not to deal with the essential idea, medium or technique. Yet we cannot expect the lay technicians and promoters from whom some of these new notions come to bring to their testing much scope of educational insight. Putting new techniques and devices to the ultimate test is our business and must be done within a framework as broad as our best thinking. Programmed learning will no doubt have its uses when we can separate it from some of its present zealous proponents as will educational television and a host of other newer developments.

Register now for

The Sixth Curriculum Research Institute (Western Section)

April 22-25, 1961

Shirley-Savoy Hotel
Denver, Colorado

Theme:

A Multi-Disciplinary Approach to Learning

Participating scholars:

HERBERT KLAUSMEIER
Department of Education
University of Wisconsin

WILTON M. KROGMAN
Philadelphia Center for Research in Child Growth

FRED L. STRODTBECK
Department of Law and Sociology
University of Chicago

Complete registration information available from:

ASCD, NEA
1201 16th Street, N.W.
Washington 6, D. C.

Another line of action is to become more articulately critical among ourselves about the possibilities and the limitations of the new. Most educational literature is nonevaluative. We have many exhortations to do this or that. We have many descriptions of what is going on. We have a great many reports that claim success, usually in a mood of self-congratulation supported with the results of simple attempts at proof. Yet we seldom have accounts of efforts to face up to the issues involved, to sharpen differences in conceptions of learning, to challenge the breadth of concern for human development. Perhaps part of this hesitation comes from the fact that most of us work for public schools and our first audience is the local constituency which has no ear for doubts and misgivings or reports of failure. We may hesitate, too, to attack colleagues placed like ourselves on public view.

Yet whenever two or three of us are together these days, we can privately assay many dubious proposals with a high degree of discrimination. We soon come to very close agreements about the need to watch with a sharp eye some of the widely publicized innovations. Some of us, if the doors are closed, are even willing to speak very frankly of the doubts we may have about some practices that we may have been "promoted into" by lay or semi-professional zealots. Unless we do come out of the back room with our best thinking, we are certainly behaving at less than the professional level. In our educational literature, we need more than carbon copies of the publicity releases fed to local newspapers.

Finally, we ought ourselves to be spending more effort in becoming increasingly inventive in finding better ways to realize our own conception of what it takes to provide the best possible program for boys and girls. Leadership has gone to lay groups, semiprofessional agencies, and foundations. This results in part because we have not ourselves moved out as boldly as we could to imagine and test the conditions that would enable us to find more opportunity for learning rather than less, to bring to every child more of the richness and range of learning, to help every individual to become all that he could become in ways personally satisfying to him and socially enriching to us all.

A. A. Lumsdaine

Teaching Machines and Auto-Instructional Programs[1]

A rationale of the media and an analysis of the programs.

WE have been hearing a good deal of talk lately about teaching machines. The topic of this paper is somewhat broader than just machines. I want to do two main things. First, I want to indicate something of the rationale and concept of auto-instructional media—of which teaching machines, as such, represent just one aspect. Second, I want to sketch in the complementary aspect of auto-instructional media, by illustrating briefly some characteristics of the self-instructional programs which teaching machines and similar devices can be used to present to students.

[1] This paper is an edited version of a presentation to the Advisory Committee for Title VII of the National Defense Education Act at the Educational Media Branch, U. S. Office of Education, in May 1960, later presented as a briefing for the Commissioner of Education and USOE Staff. For further information on teaching machines and auto-instructional techniques, see the source book, *Teaching Machines and Programmed Learning*, edited by A. A. Lumsdaine and R. Glaser. The references cited in this paper are reproduced or abstracted in this book, recently published by the Division of Audio-Visual Instruction, National Education Association.

To discuss machines without reference to machine-presented instructional materials would be as one-sided and uninformative as if one were to talk about the mechanics of movie projectors without reference to the kinds of educational films they can present to students—or to discuss the structure of a television transmission system without reference to the content of the programs that make the television system a medium of education rather than only one of entertainment.

The concept of self instruction, as incorporated in the teaching machine, is, first of all, a concept of *individual* instruction. This concept is certainly not a new one. One thinks of early man teaching his son to shoot a bow and arrow, of the Socratic dialogues, of Mark Hopkins on the other end of the log. Perhaps such individual instruction is not used more frequently in our academic institutions for only one main reason—because it costs too much. We can hardly afford a student-teacher ratio of 30-to-one; a ratio approximating one-to-one seems economically unthinkable under existing conditions. However, as John Blyth has pointed out, we often do a much better job in approximating the desirable fea-

A. A. Lumsdaine *is* ***Professor of Education, University of California, Los Angeles.***

tures of individualized instruction for nonacademic teaching—football playing and instrumental music, for example—than we do in academic courses.

Factors Involved

Let us look briefly at some fundamental considerations behind what is beginning to be called the teaching-machine movement. These considerations are basic ones, and they also underlie our more general concern with improved educational media.

Good teachers are scarce, and, at least in relation to demand, are getting scarcer. An exponentially expanding population is constantly making the situation worse. Even considering only the educational needs of the United States, it is debatable whether any remedy thus far proposed can continue to meet the quantitative demand while even holding the line in qualitative standards of the educational output. We need not even consider the even more difficult problems to be dealt with in meeting the educational needs of underdeveloped countries to conclude that there is good reason to look for fundamental improvements in education.

Merely holding the line is not going to be enough, and facing up to what is required in our own educational systems here in the United States brings us to a second set of considerations—those stemming from the technological advances in our society. These considerations are grounded in the fact that man's life from the second half of the twentieth century on is certain to be increasingly and inextricably bound up with the transformation of our world by very rapid and unprecedented technological advances. The extension and inevitable partial replacement of human functions by the digital computer and similar electronic devices have already begun, in a space of hardly ten years, to revolutionize such diverse aspects of our lives as industrial production and research techniques. This is only a bare beginning. Within a matter of decades it seems likely that what Ramo calls the extension of man's intellect through electronics will bring about profound changes in both the requirements and the capabilities of our educational system.

What have these momentous challenges to do with teaching machines? Two major implications seem obvious. The first is the promise, as yet largely unfulfilled, that these very technological advances can and probably must ultimately be used to increase greatly the resources and capabilities of the teacher. The second and more important implication is that accelerated requirements for a technically capable citizenry will impose educational requirements that will strain the inadequacy of our current educational facilities even more sorely than will the needs of our exploding population. In the face of such requirements we must look for approaches to improved efficiency in education that go far beyond what we seem likely to achieve through merely automating the lecture-demonstration by means of films and television.

Educational television is only *one* important approach for coping with teacher shortages and upgrading the quality of instruction. Despite its great potential, it has the disadvantage that often it tends only to automate the mass instructional characteristics of the lecture. The fixed pace of group instruction by film, TV or lecture does not tailor the learning situation to take account of the

enormous differences in rate at which students can learn.

I am not suggesting that we sell educational TV short. Research and experimentation on ways to improve its effectiveness are certainly very much in order. But it does seem clear that *any* medium for group instruction—including educational TV, airborne or otherwise—does not offer a full answer to our problems of educational economics. Teaching machines and other forms of individual self instruction represent another, complementary approach which in a real sense has the very strengths that educational television necessarily lacks.

Early Teaching Machine

Individual self instruction, using teaching machines or nonmechanical devices for presenting instructional materials, represents an attempt to apply concepts of learning theory, communication feedback and, to some extent, automation, in order to make individual instruction in academic subject matters a practical reality instead of an educational luxury available only in rare instances. As will be seen, the implementation of the fundamental concepts underlying this attempt depends even more on the programming of instructional material than it does on the nature of mechanical presentation devices. However, several of the basic concepts can be conveniently illustrated by looking at some teaching machines and noting their characteristics.

The forerunner of present-day teaching machines was envisaged in the early nineteen-twenties by S. L. Pressey of Ohio State University. Pressey argued that if labor-saving devices are possible in the home and in the office, why not also in the classroom? Pressey looked at the classrooms of that day—which were not too different from the ones of today—and was impressed with the time consumed by the teacher in scoring endless tests and quizzes. Not only did these fail to give prompt knowledge of results to the student; their scoring usurped an undue proportion of teacher time that might clearly be better spent in more creative pursuits. Out of this conception he developed his machine.

Pressey devised this machine around 1924. It is about the size of a small portable typewriter. A multiple-choice question appears in a window in the machine. The student might answer the question on the basis of prior study of his textbook, a lecture, film, or some other source —*including what he had learned from answering preceding questions in the series.* If he indicates the proper answer, by pressing one of four keys corresponding to the answer-choices provided for the question, the machine tells him he is correct by presenting the next question. But if he is wrong, the question stays in the window, an error is tallied, and he tries again. Pressey's original device also had an attachment for rewarding the student with a piece of candy after he achieved a predetermined number of correct answers.

There are three basic characteristics which this and all other teaching machines exemplify. First, the student learns *individually* at whatever rate best suits his individual capabilities, rather than at a lock-step pace as in usual classroom or lecture presentations. Second, he is required to keep responding actively and appropriately. And third, he receives immediate confirmation or correction for each response that he makes. This means that he does not persist in errors, and is not left wondering where he stands. In

COURTESY DOUGLAS PORTER, HARVARD UNIVERSITY

Figure 1—Children working on a teaching machine program in spelling.

addition, because his response to the materials presented by the machine is a private matter, he is not exposed to ridicule or other aversive consequences as a result of any errors he may make. These are simple virtues, but very important ones.

Despite these potential advantages, teaching machines were not widely adopted during the two decades following Pressey's initial development. This may be possibly because the times were not ripe for their acceptance. Much of the surge of interest that has become so widespread today derives from the impetus given by the work of B. F. Skinner of Harvard.

Skinner recognized that the learning materials presented by a machine can, and probably must, be analyzed very

carefully into small specific steps that can be sequenced in an appropriate order so that each step the student takes builds on to the repertoire of behavior and understanding which he has already mastered. Skinner has also stressed the notion that often it is important for the student to construct or compose instead of choosing it. One of the kinds of devices developed at Harvard to implement his concepts is shown in Figure 1.

Each of the children in this group is working individually on a self-tutoring program in spelling. The teaching materials are fed past a double window in the machine. The student writes his responses directly on the teaching materials through the open window. Then he pushes a lever that moves his answer under a transparent piece of plastic. Now he can still see it but can no longer change it. Simultaneously, the correct answer is exposed. Extensive work on spelling using this device has been done by Douglas Porter with second and sixth grade children in the Boston area. The programs of auto-instructional materials develop comprehension of new words at the same time their spelling is learned and practiced. In a report on a full year test of the effectiveness of these machine-presented self-tutoring programs, Porter (1959) has shown that spelling can be taught more effectively than by conventional methods, and also can be taught in considerably less time.

Self-Tutoring Materials

The general way this auto-instructional approach works can be illustrated by some materials in high school physics developed by D. J. Klaus, in collaboration with the writer, under a U. S. Office of Education project on new educational media at the American Institute for Research in Pittsburgh. This project was conducted to assess the contribution of self-tutoring materials used in conjunction with televised physics lessons of the Harvey White series.

The self-instructional materials used in this study consist of carefully organized sequences, or "programs" of questions and answers. Each question-and-answer segment is called a *"frame."* Figure 2 shows a few illustrative frames. The illustrative sequence in Figure 2 is arranged to simulate, in part, the manner in which the individual student is exposed to the question-and-answer panels of successive frames in an auto-instructional program.

The reader may follow this sequence, answering each question, starting at the top of Figure 2, and either writing in the answer for each question in the box or merely supplying each answer mentally before checking his answer and proceeding to the next frame. To follow the progression of illustrative question-and-answer frames for this figure, it is suggested that, in beginning, the reader *cover all but the topmost panel* (A-1) with a card or sheet of paper, thus successively disclosing each panel only *after* filling in the preceding answer box.

Note that the first few frames in the unit are extremely easy; but before long the student progresses to material of considerable complexity (which he continues to deal with easily and effectively). The asterisk (*) in some of the response boxes is a convention that was used to inform the student that the required answer consists of more than one word. A double asterisk (**) is used in later frames to show that the student should supply an extended answer, using his own words.

As the student responds to later frames, he develops familiarity through active

FIGURE 2

A-1

A very important discovery in physics was the mutual attraction of objects due to static electricity. If we rub a hard rubber comb with a wool cloth and hold it over bits of tissue paper, the comb will attract the paper. This attraction illustrates [ ] electricity.

a-1

static

A-2

At parties, you have probably seen someone rub balloons against a wool rug to make the balloons stick to the walls or ceiling. This is another example of [*].

a-2

static electricity

A-3

In [ ] electricity, some objects will attract each other. A hard rubber comb rubbed against wool will [ ] bits of tissue paper.

a-3

static

attract

A·I·R ©1960

practice by responding in varied contexts with the concepts "attraction," "repulsion," "charge," "positive," "negative," "like charges," "unlike charges," and so forth. The student, working at his own pace, practices using each term, concept and relationship in a variety of contexts and in applications of increased complexity until he has developed a thorough working command of this portion of the subject matter. This takes about ten minutes for a bright student, and up to thirty minutes for a slow student. All students, however, are able to respond with consistent correctness to a range of questions of increasing difficulty. By the end of a sequence of about thirty frames, the student is able to state in his own words the general rules for attraction and repulsion of electrical charges. Also, he has acquired a rich association of meaning and understanding of the concepts by repeatedly using them in varied contexts.

These auto-instructional materials cover approximately six weeks of instruction in the second semester of physics, and comprise about *3,000* separate question-and-answer "frames." The importance of the auto-instructional *materials* themselves—as being distinguished from a teaching machine that could automatically present them in sequence—is brought out by the fact that, in experimental research thus far, they have been presented in *book* form rather than by machine. In the "programmed" books used in these studies, the correct answer to the question frame given on each page is always presented on the *following* page, so that the student checks his answer to each frame by turning to the next page. He then goes on to the following frame on the next page, and so on through the booklet. These materials can also, however, later be used in a compact, low-cost film machine.

Last spring the 3,000 self-tutoring "frames" were used in book form by fifteen high schools in the Pittsburgh area. (These units complemented the daily TV lessons on electricity and light in the Harvey White physics films transmitted five days a week over Pittsburgh's Metropolitan Educational TV Station, WQED.) Test results for experimental classes in which the self-instructional materials were made available to supplement the televised physics course were compared with those of control classes which did *not* receive the self-tutoring materials. The test results demonstrated that the use of the materials made a significant contribution to the student's achievement. This was true even though the use of the materials was voluntary rather than a mandatory requirement.

Similarly encouraging results have also been obtained in trying out teaching-machine programs in school situations by Eigen and Komoski at the Collegiate School in New York City and by Allen Calvin in the Roanoke, Virginia, Public Schools. Numerous further tryouts are being conducted during the current school year in various locations around the country.

Use of teaching machines has also been explored with encouraging results for preschool children. J. G. Holland of Harvard (1960) has described a device for teaching children to discriminate symbol patterns and other shapes, irrespective of other cues such as color or size. The child learns to select one of three patterns to match each of a series of

(Continued on page 314)

Figure 2 on opposite page—Illustrative frames from a program in high school physics.

(COURTESY D. J. KLAUS AND COLLABORATORS, AMERICAN INSTITUTE FOR RESEARCH.)

Herbert J. Klausmeier
and Philip Lambert

Teaching Machines and the Learning Process

Only research can probe the strengths and limitations of machine instruction.

SOME school people are ignoring the existence of teaching machines. Some are probably waiting impatiently for communication experts, psychologists, philanthropists and others to design and install perfectly operating machine instruction in their schools. However, most educational leaders are demanding thorough study first and much subsequent research in school settings to ascertain the best uses of teaching machines. The leaders themselves must initiate the needed research and evaluation in their schools in order to make wise decisions.

The teaching machine under consideration in this article presents a programmed series of questions or other information to the student, provides a means for and requires the student to respond to each item in the program, and indicates the correct response to each item after the student has responded.[1] This article is further limited to mechanical and electromechanical machines, devised primarily for facilitating verbal or symbolic learning, rather than psychomotor or affective.

Eliminated from the present discussion are TV and radio, electronic equipment including tape recorders, sound movie films and similar material, typewriters and similar equipment, computers of all types, simulators used in flight and driver education, and all forms of books. Though not discussed further, TV in many subject matter areas and electronic equipment in foreign language, speech, and shorthand show considerable promise for improving instruction. Combinations of these, of course, may be successfully incorporated into complex machines.

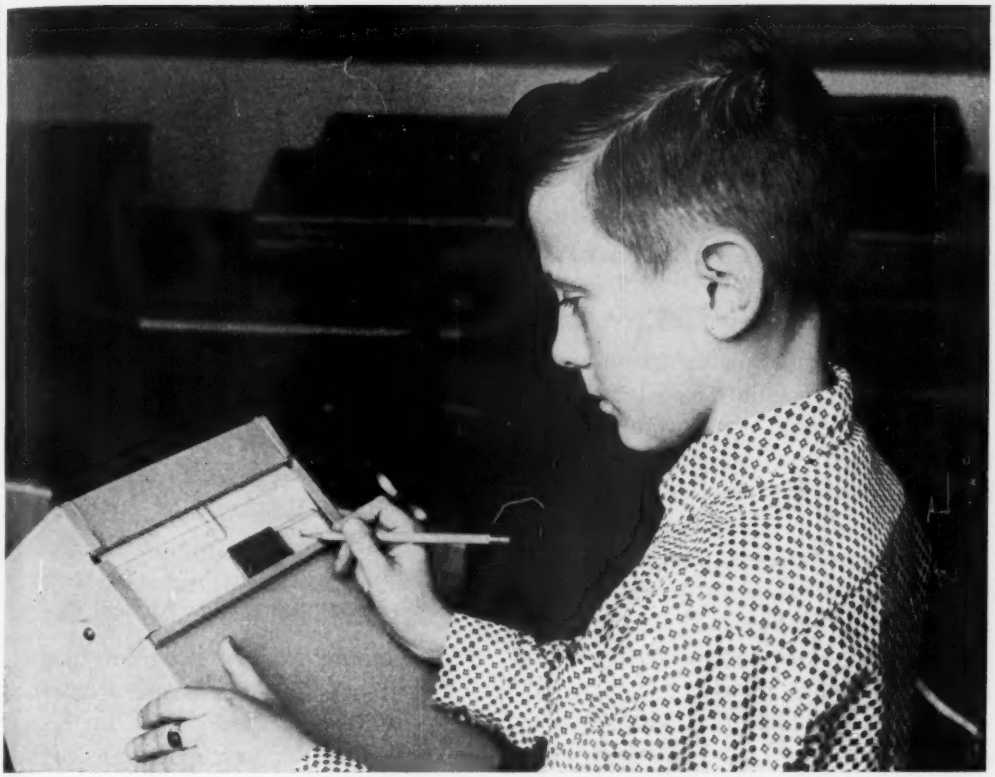
Theoretical Basis of the Teaching Machine

The teaching machine is based upon three widely discussed conditions of learning — operant conditioning, contiguity and repetition.[2]

Pavlov demonstrated that hungry or thirsty animals, under control of the experimenter, could be conditioned to make

[1] J. D. Finn. "Teaching Machines." *NEA Journal* 49:41-44; November 1960. (This article gives verbal and pictorial descriptions of five machines.)

[2] E. R. Hilgard. *Theories of Learning.* New York: Appleton-Century-Crofts, Inc., 2nd. ed., 1956. (Hilgard interprets various theories; the present authors make the applications to teaching machines.)



COURTESY JULES ROSENTHAL, MADISON, WISCONSIN, PUBLIC SCHOOLS

The teaching machine presents a series of questions or other information to the student.

a response to a new stimulus that previously had not elicited the response. Skinner bypassed this traditional approach to conditioning and proposed operant or response conditioning. He demonstrated that hungry or thirsty animals, under the control of the experimenter, could be conditioned to make a specific response or a series of responses rapidly when rewarded by the experimenter directly or by a mechanical arrangement. His ideas concerning conditioning have resulted in dramatic improvement in training animals, and have led directly to the recent high interest in machine instruction in the schools.

The teaching machine being discussed is thus firmly based upon principles of conditioning that imply controlling the student and what he learns and rewarding the student, reinforcing, or confirming the correct response as soon as it is made. The proper incidence and spacing of reinforcements in a complete program and the proper amount of repetition can be ascertained and controlled through study and use of the program.

At this point four significant questions for educational practice emerge: (a) Which outcomes of learning are adaptable to machine instruction? (b) Which outcomes of learning can be programmed successfully? (c) Can a student acquire the outcomes more efficiently when using a machine than when participating as a

Herbert J. Klausmeier ***and*** **Philip Lambert** ***are Professors of Education, The University of Wisconsin, Madison.***

member of a larger classroom group in listening to the teacher, discussing with the teacher and classmates, studying independently, reading books, and the like? (d) To what extent will the responses learned by use of the machine transfer to non-machine situations?

Outcomes Adaptable to Machine Instruction

Factual information is more readily adaptable to machine instruction than are other outcomes of learning such as attitudes and values, concepts, skills, problem-solving techniques, creative expression and personality integration.[3] Facts, of course, are important in all the latter outcomes, including concept attainment. Consider now the nature of factual information and concepts in relation to teaching machines.

A fact is something that has happened, an event, an actual state of affairs which is widely accepted as correct or true. The correct pronunciation and spelling of each word; the names given to the symbols in mathematics, music, and science; the foreign language equivalent of each English word; the location and names of geographical places; the time, place, and occurrence of historical events—all of these exemplify factual information. Much of the factual information possessed by mankind can be put in question or other form and the responses the learner makes can be judged as correct or incorrect. Further, the correct response can be supplied in a machine program, thus serving as a reinforcement or reinforcing stimulus if the response is correct and serving as an immediate correction if the response is wrong.

A concept depends partly upon factual information but is more than an addition or integration of many facts in symbol form. For example, what man knows about birds can be put in words and other symbols. Yet, though a nine-year-old child has all of the information he can verbalize about birds, his concept of bird will be far poorer than if he has the information but also has seen, heard, and touched a number of different birds. The teaching machine cannot provide the realistic experiences which are necessary for the full attainment of many concepts.

Programming the Material

Developing excellent programs to elicit the student's response is more complex than writing a series of textbooks, courses of study, or curriculum guides. The programmer must decide all the responses to be made by the machine user, the best sequence of material to elicit the desired responses, and the proper amount of repetition and related reinforcements to assure permanent learning. Assuming that the machine instruction is to be self-contained, with the teacher providing no new or supplementary information, the programmer must start with readiness material and gradually, bit by bit, lead up to each final desired response or sequence of responses.

Programs are being developed first in instructional areas such as spelling, in which the factual information is self-contained, and in symbols, most systematically organized, and least subject to more than one interpretation. The correct spellings of all words are already incorporated in dictionaries and considerable research is already completed on

[3] H. J. Klausmeier. *Learning and Human Abilities: Educational Psychology.* New York: Harper & Brothers, 1961. (Principles applying to efficient learning of each outcome are presented.)

difficulty and frequency of use of English words. If one accepts the idea that learning to read is simply learning to pronounce the words correctly, reading instruction can also be programmed but with more difficulty than spelling since a verbal rather than a written response is required. There is no reason to believe, however, that an audio device cannot be incorporated in a more complex machine to give correct pronunciations and thereby permit reinforcement of correct verbal responses, as is the case with the electronic equipment widely used in foreign language instruction.

Now follows a sample of Porter's [4] program in spelling:

1. Underline these words: *thunder, steady, soaked, frightened*

I hadn't gone half way when thunder rolled and rain came down in a steady pour. I was soaked. I made a dash for an old horse shed. And there was Wolf. Crouching in the shadow, he looked so like a wolf that for a moment he frightened me.

frightened steady thunder soaked

2. Circle the word that rhymes with *ready*?

thunder steady pour soaked
steady

3. Circle the word that means firm, regular, or not shaking:

steady thunder umbrella southern sweeping
steady

4. Write the missing letters:

Then rain came down in a s_ea_y pour.
steady

5. Write the missing letters; they are all the same:

Ragged clouds were sw__ping the south_rn sky. *sweeping southern*

6. Write the missing letters:

Without thinking of an umbre__a, I set out.
umbrella,

7. Write the missing letters:

Halfway to the store thu__er rolled.
thunder

8. Write the missing letters:

Then rain came down in a s_ea_y pour.
steady

9. Write the missing letters:

Brushing, moving quickly, s_ee_ing.
sweeping.

Notice that a relatively high level of reading is required for use of this part of a program in learning to spell. The italicized word or words under each item are presented in a box immediately after the student responds and serves to inform him of the correctness of response or to provide the correct form if he has not responded correctly.

Efficiency of Machine Instruction

Few educators deny that learning factual information as defined previously is and should be required in many instructional fields, primary through graduate school, and that much of the factual information must be memorized originally and then reviewed. Yet the amount of repetition and subsequent memorizing of the same factual material at successive school levels is a serious indictment against the instructional procedures currently employed. The principal problem here is that many teachers are presenting the same material to all individuals within the class but the students are neither acquiring nor remembering it efficiently. The original learning is inefficient in part because students cannot learn at the same rate and in part because one teacher working with a classroom group of 25-35 cannot provide either the proper amount

[4] D. Porter. "Some Effects of Year Long Teaching Machine Instruction." In E. Galanter, Editor, *Automatic Teaching: The State of the Art*, New York: John Wiley & Sons, Inc., 1959. p. 86, 87.

of reinforcement or confirmation at the right time for each student nor can he help each student to identify and overcome errors immediately.

Permanent learning of factual material is facilitated when the learner wants to acquire, retain, and use the facts; the facts are organized into appropriate learning units; the learner makes the correct response on the first try; correct responses are reinforced and errors are corrected immediately; distributed practice is carried out until the facts are firmly established; and each individual proceeds at a rate appropriate for him. It is entirely possible that these conditions can be incorporated into machine instruction for individuals within a class better than any teacher can incorporate them into daily activities with a group of students in a classroom.

However, for machine learning of factual material to be efficient, an approach to curriculum and instruction different from that in many schools must be accepted; namely, each student must be encouraged to proceed at a rate suitable for him. In some schools today, the highly proficient fourth-grade children are not being permitted to study the fifth- and sixth-grade spelling lists; and the less proficient are held to the fourth-grade list even though the second-grade list is better suited to them. The same is true in many other instructional fields, particularly in high school and college, where teachers expect students to somehow acquire identical amounts of factual material in the same amount of time.

Final answers as to which outcomes, besides facts, might be acquired more efficiently by children and youth of varying characteristics through machine than non-machine instruction wait upon further research. The authors believe that machine instruction as currently conceived promises greatest effectiveness for the type of factual information previously illustrated.

Transfer

What are the possibilities for transfer of machine-acquired responses to other situations? Four generalizations about transfer of learning must be considered. First, general information, principles, methods of study, attitudes and values, and methods of adjustment transfer more readily from one situation to another than do technical information, isolated facts, and specific skills or responses. Second, outcomes acquired with meaning transfer more readily than do those acquired without meaning by rote memory and repetition. Third, outcomes which are learned well originally, and therefore are not forgotten, transfer more readily than do those not learned well. Fourth, the learner must perceive how present learnings apply to other situations.

The main possibility for better transfer from machine instruction is in connection with the third generalization. Machine instruction may lead to more thorough learning originally. Also, some programmed material may be more meaningful than the same material which is currently presented in textbooks, work books, and orally by the teacher. We may expect verbal learnings acquired by machine use to transfer to other situations in a fashion similar to that between learning to spell correctly in school and then spelling correctly the same words outside the teaching-learning situation.

Research on rigidity and set in problem solving shows conclusively that when an individual experiences repeated success in solving problems with a certain method or instrument, he clings to that

method or instrument even though it is inappropriate for solving new problems he encounters for which other methods and/or instruments are appropriate. Thus, through widespread and repeated use of machines and the method of learning incorporated therein, students may become highly dependent upon someone else to decide for them what to learn, how, why, when, and how well to learn it. This could lead to negative transfer to non-machine learning situations and to lack of sensitivity to problems, of originality, and of flexibility. Also on the negative side with respect to transfer from machine learning is the possibility that many outcomes cannot be acquired with meaning; further only verbal applications of new learning can be presented in the teaching machine.

Here enters a critical value judgment about education. What is education? Drawing out by the teacher and seeking by the student, or putting into the student correct responses and satiating him? Machine instruction, as indicated in the previous discussion of theoretical bases, is designed to encourage the learner to respond correctly or appropriately, as determined by the programmer. The better and more widespread the machine instruction, the more fully must the learner come to rely upon it as the most efficient way for him to learn.

Research, Not Rejection or Faith

The above extreme viewpoints about education are not as black and white as described. However, the possibility of negative transfer should not be ignored. At present, little or no research has been reported about the extent to which machine instruction of any outcomes may produce positive, negative, or no transfer to non-machine situations.

The previous discussion presents some of the strengths and limitations of machine instruction. The two authors do not agree completely on the emphasis given to various points, but they agree fully that educational leaders responsible for learning in school situations must somehow mobilize efforts and monies to conduct essential research and evaluation concerning machine instruction. The schools cannot afford to introduce new practices and equipment on good will, faith, and salesmanship in the absence of research; nor should they prevent more efficient pupil learning because of traditions, institutionalized impediments, or apathy.

Educators employed by the schools, with assistance in research design and evaluation procedures from others as necessary, should seek answers to the questions previously raised and these:

1. Which human abilities can be nurtured effectively through machine use? For example, can the ability to communicate orally in a foreign language, the ability to spell correctly, the ability to work well with others, the ability to identify and solve problems, be nurtured equally well with machines?

2. Is machine instruction equally efficient with all age groups? For example, will first graders learn as well as high school seniors?

3. How long will students of any age respond with high motivation to machines? For example, if half the instruction is incorporated in machines, will students use the machine without teacher forcing for a week? month? year? six years? twelve years? Will they want to learn from machines throughout life, as many now do from books and other printed material?

(Continued on page 324)

O. L. Davis, Jr.

Technology and Purpose in Teaching

Whether medium or material, the purpose it serves is paramount.

TEACHERS have long known that a student can learn by himself and must accept responsibility for his own learning. Sometimes, they have expressed in aphorisms their understandings of this phenomenon of the teaching-learning process and their role in it.

"You can lead a horse to water, but you can't make him drink."

"I can't learn for you, and I won't even try. But I'll help you any way I can."

In the fore of current efforts to change school practices are those who describe the advantages to accrue from widespread adoption of new electronic and mechanical devices. Television and automated instructional devices have been added to the familiar audio-visual media. These advocates of technology insist that by using modern instructional devices the learner will assume more responsibility for his learning, the learning will be quality controlled, and the role of the teacher will be redefined drastically. Less frequently now are economy of talent and of school dollars listed as primary outcomes of such use. The suggestions are implicit that only with the new devices can the objectives of quality learning for the realities of modern life be fully met and that the principal function of the teacher is presentation of material.

O. L. Davis, Jr., *is Associate Director, Fifth Year Program in Teacher Education, School of Education, University of North Carolina, Chapel Hill.*

On His Own

It may well be that those proposing the massive use of instructional technology have overdrawn their case or have not been privileged to observe good teaching-learning situations. Yet teachers recognize the importance of a learner's assumption of responsibility for his learning and desire to structure opportunities for him to continue to learn with progressively less teacher supervision. At least, no responsible pedagogical theory suggests otherwise. Mrs. Jones' exchange with another first grade teacher illustrates teachers' awareness of these ideas. "John is on his own now. He knows a good basic vocabulary and can attack new words very well. He'll need help along, but, basically, he's on his own."

The first grader is not only learning to read. He is reading to learn. And the teacher has worked herself out of a job. And she is proud of it.

The young boy will need Mrs. Jones still. He won't need her for the same reasons, though. One day, with book in hand, he may ask, "Why is *good-bye* sometimes spelled *goodby*?" Or perhaps, "Last night on TV, I saw a war film about the Germans shooting American soldiers. Do we like the Germans now? I don't think I do."

The teacher's role is still the same as it was the day the little boy read "Dick": to assist him in developing meaning and understanding.

Next year, and the year after, and every year, the boy will learn on his own. He may be one of a small group attacking a problem, in a vast audience, or isolated physically from others. He will see the world and interpret it in his own way, perhaps quite differently from anyone else, selecting what is important and enhancing to him.

To be sure, he will have assists and he will encounter obstacles in his learning. His potential may be curtailed or it may be unleashed. He may use many stimulus sources or he may be stimulus-deprived. But if he learns, he will do it. The quality of his learning will be affected, in no small measure, by his perceptions, by how he sees the world, much less by how others see it.

Enthusiasts claim that television and teaching machines make unnecessary the constant mediation of a teacher in one's learning at school. They are right, of course, in their observation that students can learn and often do learn, without a teacher present. To be fair, in this analysis, one must indicate, at least, the possibility of learning in the presence of, even because of, the teacher. Also granted is their implication that students do not always need another person close at hand in order for learning to occur. Admitted, too, is the fact that interaction with others is not necessary for every learning task.

To observe children and their behavior is to document the fact that they learn as a result of watching television. Recall the early days of commercial television. Even in that period, adults gave frenzied attention to the impact of television on children. Grim prophesies of a generation of passive children were dissipated as the novelty wore off and as children and parents decided which programs were worth viewing. Forecasts of a rapid decline in reading failed to materialize. One might even speculate on the increase in reading in the post-TV decade as caused by the stimulation of televised fare or a growing distaste for the medium's offerings.

The fact is profound that children learn much from viewing television. They bring to school ideas, questions, suggestions, concepts, attitudes and skills for which television may be given credit. Moreover, they learn many things earlier than some persons had thought possible. "Experiments" and demonstrations are unneeded to provide evidence that children can learn from television at school.

Children can also learn using programmed devices such as teaching machines and foreign language laboratories. The learner, using such materials, can proceed at his own rate, knowing at every step along the way his successes and errors. The learner need have only the program and work. Research evidence is impressive regarding the amount of material through which a learner can proceed using these devices.

With so much concern over newer instructional technology, some may forget that learning can result from the use of films, radio, and other audio-visual materials—and without the mediation of another person.

Likewise, people still learn effectively using books and other printed materials. Others need not be present when a book is read or studied, not even a teacher.

The writer recalls that hot Texas summer when he learned algebra using a single textbook and much chalk. Between plowing sessions, he proceeded through the book, page by page, at his own rate of speed, working every problem step by step. He knew immediately his success or lack of it (his book had answers at the back).

Programming

In effect, the algebra book served as a program. It probably was an unsophisticated program according to current standards. Yet an aura approaching mysticism is now being attached to the word *program*. Shatteringly sobering is the fact that almost all current programs for automated instructional devices were written with a book as their source. Too, many programs are published and used in book form. Most teaching machines use printed programs, while one high-priced device has been described as a machine that flips pages rapidly (even though the "pages" are filmed).

Books, rigidly programmed or artfully written, are important sources for and stimulators of learning. Fortunate it was that the printing press was invented. Since then, each person, for secular or religious purposes, could read without the interposition of another person. In the reading, he could interpret the message for himself without its being filtered through someone else.

Students also learn without learning schedules and need, on many occasions, to be in groups, to interact with others. They let their ideas romp and clash, make new associations, achieve new syntheses:

> . . . Today, the clouds are different from those of yesterday . . . The baby cries and waves his arms when I start to give him a spoonful of food, then jerk it away . . . In the late afternoon, the doorknobs are shiny in your room; those on my door are dark. Of course, the sunlight comes in your room but not in mine . . . Wilson and I figured out the answers real quick. It's good to work with someone. Sometimes Wilson's idea was better; sometimes mine was. Together, we really did fine. . . .

The crucial factor in students' learning need not be the teacher or another person. A particular device or program is not the all-important ingredient. Yet they may be important conditions. Central to learning is the learner, his background, needs and motives, and the perceived requirements of the learning task.

Learners will use everything available to help them gain more precise meanings, more adequate understandings of themselves and their environment. They will use people and materials. They will experiment and test. They will, that is, *if* they have the opportunity. In school, teachers have the responsibility for structuring opportunities for each individual's learning.

Purpose in Use

The important questions about teaching and the use of materials, therefore, do not relate to particular methods or certain devices. Can TV teach? Shall we use TV or a book? Shall we use a machine-programmed course rather than a teacher and a library?

Such questions miss the point. To attempt an answer without knowing the purpose of the learning situation would be to choose between apples and onions without knowing the particular dish to be prepared.

Technology does not dictate the purposes of its use. Because television equipment is available is insufficient reason to insist that the medium can or should undertake the entire or a major portion of the schooling task. So it is, too, with programmed materials, films, books, lectures, demonstrations, small-group work, and other devices and methods, singly or in combination. The important questions about teaching relate to the purposes of schooling and the objectives of the curriculum.

The most effective teaching includes, but is not restricted to, the selection or suggestion of the appropriate materials to enhance each individual's learning with regard to those purposes and objectives. To prescribe the same television program for all eleventh graders studying American history differs only in kind, not degree, from assigning these same students to read the identical section in the same book. To criticize such a use of television in teaching as devoid of the human element is to indict the use of the textbook on a like charge. Such criticisms, while correct, may not be competent educationally. Exchanging charges obscures the real issues of method just as mass-television or mass-lecture or mass-small-group-activity or mass-read-the-same-book obscures the purposes of the activity. Prescription of method and materials outside the context of pupil and purpose resembles the stock joke of armed service life: no matter how you feel, the medic will give you aspirin.

Teaching can and must always implement the purposes of schooling. Now, using the gifts of modern technology, teachers have available a veritable pharmacy of possibilities to use in structuring learning opportunities. True, procedures and instruments for assessing individual learning needs and deficiencies still do not exist with the quality and in the quantity desired. Too, additional methods, devices and materials can be anticipated, such as the "gaming" of educational problems, using advanced electronic data-processing computers. Teachers, even so, may select a material with the potency of cortisone on some occasions and, at another time, choose some older and more familiar learning material or medium of the variety of brewed bark-tea. The potency of the medium or material, educationally speaking, is determined by the purpose it is to serve at a particular time with a particular learner.

Effective Teaching

The availability of a *smörgasbord* of media and materials is not suggested. Rather, teachers and pupils, sometimes separately, sometimes in common, must examine, with rigor, the learning task and its purpose, the appropriateness of the available materials and media, and the learner's background and learning needs. Then the medium or material selected is applied to the task at hand. The role of the teacher has been redefined only as it has been extended. As the physician's practice was made more precise by the development of the thermometer, the stethoscope, the X-ray machine, the electrocardiograph, so is teaching enhanced by the development of new, potentially powerful instructional technology.

Teachers should and will choose to use every device, every method. They will remain competent as they insist that the use of these devices and methods is consistent with curricular objectives. To allow the availability of technological hardware or the familiarity of comfortable methods to dictate their use will be to abdicate professional responsibilty and to invite instructional anarchy.

William C. Kvaraceus

Need we preserve a humanizing element?

Future Classroom— An Educational Automat?

THE embodiment of the ethos of our age may best be found in the automation processes and gimmicks exemplified by the vending machines (gum, soft drinks, newspapers, or pocket combs), the washing machines (clothes, dishes, even automobiles), and, on a more grandiose scale, the IBM installations. All these automatic devices save time and labor—and, of course, money.

Perhaps it is inevitable with the inroads made by the projector, record player, tape and wire recorder, TV screen, and teaching machine that the classroom of the future will take on more and more the efficient and economical appearance of an educational automat. If so, what is likely to be gained and what is likely to be lost to the young learner through the fast-growing trend toward this type of self-teaching process?

Three personal incidents, in one way or another, have accentuated the "teaching machine" or automation issue for me in recent weeks.

Motoring from Boston to New York City recently, I drove down the new Connecticut Pike—a multi-laned highway studded with toll stations. As I approached the first toll gate the big decision "correct change this-a-way and all others that-a-way" was forced upon me. Armed with the "right change" I fed the automatic register and as my coins clinked in, a most impersonal sign blinked out a mechanical "Thank You." After two of these "Thank You's," I found myself driving through the stiles manned with humans rather than machines. Somehow I felt less lonely and more a part of a live universe hearing a human voice say, "Thank you"—even though in perfunctory fashion—and seeing a human hand take my change.

Walking across a well-known eastern university campus not long ago, I glanced in on a classroom (perhaps better described as a learning laboratory) and noted a number of students closeted in separate cubicles. They were all wearing earphones and were apparently listening to tapes. But there was no sign of a mentor around. If students are present, need there be a mentor nearby?

On returning home one evening, I was greeted by my daughter Jane, now in the fifth grade and in her second year

William C. Kvaraceus *is* ***Professor of Education and Chairman, Department of Special Education, Boston University, Massachusetts.***

of TV French: "Bon soir, Papa! Je m'appele Jeanne." "Merci," I answered, "mais tu parles comme une jeune fille Française." She had learned all her conversational French from a TV screen.

How depersonalized can the classroom be and what are the effects—immediate and long term, good and bad—of seeding the classroom with mechanical aids that enable or even insure effective self-instruction and learning? (The term "teaching machine" is much too controversial to be used in this discussion and makes too difficult a fair and objective consideration of this topic. Equating even a part of the teaching function to a mechanized gadget presents to many workers in the educational vineyard a threat to the worthwhileness of the human teacher and even to the teaching profession as a whole. In what kind of profession have we been engaged, if much or most of our function can be programmed more effectively on some mechanical gadget? Such a train of inquiry can interfere with a fair consideration of the real promise and the real problems inherent in auto-instructional devices.)

Devices and the Teacher

The answer to the major questions that have been raised will come only through a consideration of two subsidiary queries: (a) What part of the educational process and product can be effectively programmed for self-teaching devices? and (b) What is the unique role and function of the teacher in today's classrooms?

Before considering these two essential questions we must recognize that the modern mechanized aids can hardly be considered "recent innovations." They have had their counterparts (and their critics) in earlier times and in less technological cultures. The abacus, the hornbook, the tachistoscope and the more recent paperback workbook were all devised to assist the pupil to engage himself in worthwhile learning experiences and, at the same time, to release the teacher from the class as a whole enabling him to apportion his time and energy more effectively.

What Can Be Programmed?

Accepting the mounting evidence that auto-instructional aids can and do abet certain types of learnings in certain subject areas, the basic issue does not center around the question, "Shall we use them?" Rather the issue turns on the more discriminating query, "When and how shall we use these aids?"

What we need to do at the outset is to review and set down a concise statement of the ultimate purposes of the educational processes and to mark out those particular outcomes which can now be programmed for machined learning. There is already some consensus that the self-teaching devices can handle learning outcomes which constitute factual material that can be itemized. Such learning product must be clear, simple and categorical; what is to be learned must be cut up into small, discrete but interrelated elements. Such learning generally falls at the levels of recognition and recall.

Unfortunately few personal, social, economic or political problems that are met in everyday living tend to be clear, simple or categorical. Furthermore the more crucial and far-reaching outcomes of learning will always be found at the level of interpretation, application, appreciation and invention. These levels are still outside the reach of most self-learning devices and thereby place a low ceiling on what is to be mastered.

Let us take a hard and realistic look at the nature and levels of the learning product that now preoccupy the combined human-teacher and pupil effort in most classrooms today. The impartial observer, on the basis of such observation, would be forced to admit that the self-teaching devices could be used to replace at least 75 percent (a subjective but conservative estimate) of the teaching function as played out in the typical classroom and reflected in the time-honored and time-worn ritual of lesson assigning, lesson hearing and lesson marking. This in itself is a most serious indictment of teaching in the school agency.

If learning product and outcomes of the school operation are viewed (as they must be) in terms of desired changes and modifications in pupil (and ultimately adult) behavior or in terms of new and desirable adaptations or ways of behaving, the limitations of what learning outcomes can be programmed become readily apparent. To know, to recall and to verbalize represent important and initial objectives of education, but they are seldom the ultimate goals. Living out the objectives of the school in play, at work, on the job, in the home and in community endeavors represents the real test of the educated person. Homes, neighborhoods and nations of the world do not so much lack "educated" persons who can pass or have passed advanced tests and examinations in the hard subjects so easily programmed as persons who can and do aspire to the *Summum Bonum* in the Judaic-Christian tradition as seen in the victory of the selfless as promised in the Ten Commandments and in the Sermon on the Mount. There is all around us today ample and tragic evidence, in the product of schools, that the factual teachings of the classrooms are falling on barren ground and among tares. Too few learners have been inspired to selfless behavior.

As Goethe pointed out at the turn of the 19th century, "A teacher who can arouse a feeling for a single good action, for a single good poem, accomplishes more than he who fills our memory with row on row of natural objects, classified with name and form." The young learner is much more than a memory drum on a 650 computer. He is a living, growing, feeling person. How he *behaves* is as important as what he can memorize and verbalize. Having looked at the unique function of the self-teaching aids, what is the unique role and function of the mentor?

Role and Function of the Teacher

What is the tutorial teaching that is promised as a solution to large-size classes and to the perennial problems of individual differences via the self-pacing auto-instructional aids? Will such teaching enable some strategic shifts in teaching role and function?

As a director of the learning process and as a "mediator of culture," the teacher plays many different roles[1]: he is a botherer, motivator or stimulant; he is a person who knows; he is a guide in the selection of learning activities; he is an evaluator; he is one who maintans order; he is the creator of a "moral atmosphere"; he serves as parent surrogate and character model. Some of these roles will be more affected by self-teaching gadgets than will others.

As "a person who knows," the mentor will need to know more. He will need to be more informed in learning theory and the communication processes. He

[1] "Teacher's Role in American Society," *Fourteenth Yearbook of the John Dewey Society*. New York: Harper and Brothers, 1957, Chap. 6.

will need to discriminate between content and to supplement programmed learning. And he will need to know each student's readiness for the various steps and types of programmed and unprogrammed learning. Even with a full bin of programmed concepts in his subject matter field, it is highly doubtful if the teacher's need to know subject matter will in any way be diminished. (One can almost see the phantom image of the teacher, trained only in machine methods, getting all his subject matter from the programmed library. This specter should keep the methods-baiters — Barzun, Bestor, Rickover, etc.—in a dither during the next decade.)

Anonymity

More crucial are those questions of role as they affect interpersonal relationships in the class and the growing threat of anonymity and impersonality if machine-oriented teaching means restricting the occasion and incidence of teacher-pupil and pupil - teacher interaction. Programmed learning must insure and enable more and deeper relationships between teacher and learner by releasing the instructor from time-consuming routines. In fact the introduction of auto-instructional devices should be justified on this basis as well as on learning increment.

Many of the current experimental studies of the use of self-teaching tools and techniques report that students "enjoy the experience of learning with auto-instructional devices." The teaching personality must be pale indeed if students prefer to relate to a machine. Perhaps these devices do have something in their favor. Unlike some mentors, the machines are infinitely patient and always rewarding via "positive reinforcement." They will never "take it personally" or "take it out on the learner" if at first he does not succeed. Machines may have the psychological advantage of not getting psychically involved. Few learners will be afraid to admit to the mechanized teacher, "I don't understand" or "I don't know"—phrases that bounce harshly off the sensitive ears of many human teachers. And in those classrooms where the climate is hardly safe or sanitary from a mental hygiene point of view, introduction of self-teaching devices may even help to neutralize the atmosphere. But, again, who wants to relate to a machine, especially since it does not seem to care?

When the novelty of levers, lights, and pushbuttons wears off, auto-instructional devices may have difficulty in attracting, interesting, and especially exciting the student to greater effort. As Anatole France once pointed out, "The whole art of teaching is only the art of awakening the natural curiosity of young minds for the purpose of satisfying it afterwards." This is the "botherer" or "motivator" role of the teacher. In stimulating, if not inspiring, the reluctant and recalcitrant learners (the Number Two problem of the teacher, according to a recent NEA study of working conditions in the classroom) the auto-instructional machinery may fail because many nonlearners, who now refuse to open their books, may refuse to turn the gadgets on.

Identification

In anticipation of this problem, any requisition for these devices should include a sizeable order for the model that comes with built-in handcuffs and leg irons that will be needed to hold many pupils at their machine-desks. Of course this may eliminate the post of "truant officer"—currently a very busy function

ary in many neighborhoods in the larger urban-industrial centers. But that's the way it is with automation—it always means the elimination of some jobs!

Today through the intricate and intimate process of identification based upon a positive relationship between teacher and learner, many human mentors affect (and more could) the lives of children and youth and bring about significant changes or modifications in their behavior when they play out their role as parent surrogates and their role as creators of a moral atmosphere by presenting themselves as attractive and inspiring character models. If we assume that few learners will identify with the machine-instructor, we cannot at the same time assume that all learners will readily identify with their human mentors. But some youngsters do and more could and should identify with the teacher. It is the person (personality, if you must) of the teacher that is a paramount factor in improving the quality of the learning process. The teacher who has not himself achieved an emotional maturity and authenticity and who is hardly excited or interested in the teaching-learning drama in his field will not communicate to others the adventure, romance and battle-heat implicit on any learning frontier.

Instead of merely looking for a machine replacement, we should find for this instructor a better human replacement. The terrible reality that many youngsters face daily in the classroom confines them to close living with dull, listless and lukewarm personalities and the classroom becomes a place of boredom filled with never-ending and useless tasks that must be completed to keep the teacher happy or at least out of your hair. In contrast, perhaps the blinking and clinking machine looks exciting and contemporary to the bored learner. It is significant to note that after 12 years of association with teachers, very few high school graduates rush to fill in the ranks of the teaching profession and that such occupational selections generally represent second or third choices.

It has already been suggested that justification for using self-teaching equipment must stem from both learning increment and the fact that these devices can free teachers and enable them to play out their human relations function in a socialized classroom. Through this desk-side function it may be possible to make what is learned on the machine and elsewhere significant and meaningful in life situations. "Trees and fields tell me nothing," Plato once observed. "Men are my teachers."

Auto-learning devices are here to stay. They will not revolutionize the classroom nor will they eliminate or even minimize the job and function of the human teacher. (Note, however, the "remedial instructors" had better retool in view of the research claims of some experimenters that "Total mastery has been exhibited by most experimental students." Perhaps, however, even these jobs are "safe" in view of the difficulties and complexities in the psyche and the culture and subcultures which frequently interfere with learning.) Karl Marx once expressed his concern for "intellectual desolation artificially produced by converting immature human beings into mere machines." To paraphrase him in the present situation, we should be concerned with the threat of emotional desolation that may be artificially produced by crowding the teacher out of the classroom and learning laboratory, thereby converting immature human beings into mere intellectual machines. Our vision is *not* "machines for making more machines."

Milton L. Shane and
Helen Lacy Shane

Laboratories for Foreign Language Teaching

Coming into general use are language laboratories.

OUR experience with language laboratories has been at two levels: a college laboratory in operation since 1952, and a training school laboratory installed some nine months ago. Reflecting current trends, the high school laboratory is larger and much more expensive, and it provides for a somewhat greater number of students. The languages taught are French and Spanish.

Our approach to modern language teaching rests on several assumptions: (a) Vital national interests demand the training of increasing numbers of Americans to be proficient in one or more modern languages. (b) Proficiency in modern languages will generally be used to increase professional or technical efficiency in nearly every field conceivable. At the same time the demand for trained modern language teachers is rising sharply. (c) Under these conditions, proficiency means first of all the ability to *understand* a foreign language when spoken by natives, and to *speak* the foreign language so as to be readily understood by natives. The skills of reading and writing follow and depend upon the skills of listening and speaking. (d) The acquisition of the listening and speaking skills is based upon neuromuscular memorization (analogous to learning to play a musical instrument), and must involve prolonged and regular periods of drill.[1]

These principles were successfully applied in ASTP language programs as early as 1943, but such programs were too costly and too cumbersome for nonmilitary institutions. The modern language laboratory has been devised to provide something like the ASTP learning experience in a more practical form. The laboratory does provide the voices of native speakers as models for learners, and it makes possible effective simultaneous practice in large groups.

Milton L. Shane ***is Professor of Modern Languages, George Peabody College for Teachers, Nashville, Tennessee; and*** **Helen Lacy Shane** ***teaches French and Spanish in the Peabody Demonstration School.***

[1] A more detailed statement of these principles will be found in: Johnston, Remer and Sievers. *Modern Foreign Languages.* U. S. Office of Education Bulletin 1960, No. 20. Washington, D. C.: Superintendent of Documents, U. S. Government Printing Office. 30 cents.

Let it be said at once that this implies full-time use of the modern language laboratory. Every language class must devote some time to laboratory drill every day. The modern language teacher cannot afford to share the laboratory with teachers of other subjects, any more than a music teacher can afford to share her instruments, or a typing teacher his typewriters.

Although we at Peabody have made no attempt to use the laboratory in teaching foreign languages in the elementary school, we do not believe that laboratory instruction is suitable for the preadolescent child.

Laboratory Equipment

For teachers who wish to develop listening and speaking proficiency in their students, a record player and a tape recorder are the minimum essentials. Using suitable recorded materials, these machines make possible much practice in listening and repeating, in concert and individually.

The fully equipped laboratory adds to the experience of listening and repeating, the means of self-criticism by recording and playing back. Each student works in a semi-private booth, equipped with headphones, microphone, and a tape recorder. He listens to prerecorded material, spoken at normal speed by native voices, repeats what he hears in pauses left for the purpose, and then is ready to play back the recording of his own repetition in alternation with the native model. Unlike any other type of language learning activity, this permits every student to recite simultaneously and receive correction in the laboratory period.

The Peabody College laboratory is of the library type. Students in first and second year classes are required to schedule two laboratory periods per week, in addition to four periods of class attendance. In the laboratory each student checks out a tape, goes to a booth, and works independently of others, listening, repeating, recording, and playing back such material as he thinks most needed, throughout the period. The laboratory attendant checks the roll, issues tapes, and gives assistance in operating equipment if needed. Another assistant works week-ends, duplicating tapes as needed. The services of an electronics repairman are available.

This type of laboratory, providing maximum opportunity for independent preparation, seems satisfactory at the college level. We are convinced that it would not work well with high school students.

An alternative form of laboratory is the console or broadcast type, in which the instructor controls the rhythm of listening, repeating, recording, and playing back through a central console; and at the same time monitors the work of individual students in turn, using a two-way communication system to give corrections as needed in absolute privacy.

The fully equipped console laboratory provides a tape recorder for each student. The tape recorder may be in the student's booth, operated by the student; or miniaturized tape recorders may be stored in a remote control cabinet, and operated through the central console. This latter plan obviates tape spillage, unintentional tape erasure, emergency splicing, and various types of mechanical mishap incidental to student operation of tape recorders. The tape recorders in the remote control cabinet are loaded with endless-loop cartridges, which run forward only and provide for playback at the end of a cycle—usually three or five minutes.

COURTESY GEORGE PEABODY COLLEGE FOR TEACHERS

Each student works in a semi-private booth.

The system just described (the Linguatrainer) was originally developed for the Massachusetts Institute of Technology. It is the one installed at the Peabody Demonstration School. We find it well adapted for use during class periods. Each class spends a part of each period working in the laboratory, and the rest in conventional classroom activities.

Indispensable accessories to this (or any) language laboratory are a tape recorder, a record player, and a library of tape and disc recordings. These are used to transfer prerecorded material to the cartridges used in the Linguatrainer system; or to the library tapes used by the students in the college laboratory.

Indispensable, too, are the services of an electronics repairman who has become familiar with the laboratory and is readily available. Emergencies will arise. It is important to have spare parts always on hand. A wiring diagram should be on file, particularly if a substitute repairman has to be called in.

Materials and Methods

As previously implied, proficiency is achieved by listening to recordings of native speech and imitating, repeating, correcting and repeating until new speech habits are firmly established. Materials to be memorized consist of dialogues and pattern drills. Dialogues, which are the core of each lesson, present real-life situations of wide interest and are arranged in a suitable sequence for learning structural forms of the language. Pattern drills are suggested by passages in the dialogues, but give additional drill

on new structural patterns as these are added.

Teachers who meet four or five classes per day will not have time to create new textbooks of this type. Fortunately, a number of college texts in French, German, Spanish, and Russian (inspired by the ASTP Spoken Language manuals) have come on the market since 1950, and are now available completely tape-recorded. A few high school texts have recently been modified for laboratory use, and complete tape recordings of these texts are available. We have one completely new textbook, written to meet the needs of present-day teaching organized around the language laboratory. This is *Modern Spanish* (published by Harcourt, Brace and Company, 1960), written by a committee of authors as a project of the Modern Language Association. It is tape-recorded. So far as we know, no comparable completely new text has been produced at the high school level for any modern language. Such textbooks are badly needed.

Theoretically, any teacher who speaks the language natively can prepare his own recordings; but this is an enormous task. It also limits the students to hearing one voice, rather than the variety of men's and women's voices now available in all the commercially taped texts referred to previously.

It should be clear at this point that teaching techniques figure largely in the selection of a textbook, and in the day-to-day preparation (or re-taping) of taped material for laboratory use. Once the student is in the laboratory, the nature and organization of the material will largely determine and control activities.

Note, however, that the laboratory makes it possible for retarded students to work at earlier lessons, or specially assigned material, without hindering the progress of the group. Exceptionally able students may likewise work with special materials.

Additional laboratory periods may be scheduled for those who need or wish them. In a high school situation, students may spend study or library periods in the laboratory when this is thought advisable. Through the console, such pupils may be assigned individual tapes with which they will work in a library situation. This assumes that the laboratory has a few booths available each period, over and above the number in the largest class.

At the second-year and more advanced levels, relatively few taped textbooks are as yet available for laboratory use. There is, however, a wealth of literary material recorded on disc and tape. The ingenuity of the teacher will find full play in adapting such material for laboratory use: inserting pauses for repetition, adding drills to fix new details of structure, providing questions based on the text, spacing passages to be used for self-dictation, and so forth.

Similar use may be made of foreign language programs taken off the air, particularly newscasts.

Testing

As the laboratory is used to develop the skills of listening and speaking, it is these skills which can be tested there to advantage. Actually, group tests of listening comprehension, such as those published by the Educational Testing Service, need not be given in the laboratory. Students in a conventional classroom may listen to a tape recording and mark multiple-choice responses on an answer sheet. However, acoustical conditions are unequal unless the test is given

COURTESY GEORGE PEABODY COLLEGE FOR TEACHERS

Students recite simultaneously and receive correction in the laboratory period.

in the laboratory, where every student hears the recorded material with equal volume and fidelity. Shorter listening comprehension tests of this type may be prepared by the teacher and given in the laboratory.

The most difficult skill to measure is that of speaking. Heretofore this was tested through interviews, which were time consuming, and difficult to score objectively. Laboratory tests of speaking reduce the testing time 50 percent, since an entire group may record responses simultaneously. The simplest type of test is one in which the student is asked to repeat sentences (arranged in ascending order of difficulty) as he hears them. Scoring is done on predetermined points of pronunciation and intonation, as well as memory span. Next come tests in which the student is asked to modify sentences in accordance with a model which is given. These are simply pattern drills with the correct response omitted. Such tests may range from very simple to very difficult. Finally, students may be directed to ask or to answer questions.

It goes without saying that no exercise should be given as a test until students have practiced thoroughly the equivalent drill. Moreover, frequent practice tests on familiar material will reduce the tension created by this unfamiliar kind of examination.

It will be noted that tests consisting of responses recorded by students in the laboratory, must be heard and scored in the laboratory. In the console laboratory, the instructor can monitor all student tapes through the console, one after the other, when the group examined has vacated the laboratory; but this is a lengthy

process, and the work must be completed before another group uses the laboratory, unless it is possible to withdraw the cartridges or tapes carrying test material, shelve them, and insert fresh tapes for the next group of testees.

A much cruder technique is to test students in the laboratory one at a time, but briefly. In this instance each student in turn hears the same test recording and each in turn records his responses on a single large reel of tape. This tape, carrying the test recordings of an entire class, may then be played and scored anywhere at the convenience of the instructor. However, this plan creates more nervousness on the part of testees, since the familiar laboratory situation is somewhat modified.[2]

One item of equipment which may be on the market, though we have not seen it, is a portable record-playback unit for tape cartridges. This would be very helpful in the preparation of materials. It would likewise be useful for scoring student recordings away from the laboratory.

Speaking in general, we hope and are inclined to believe that equipment will soon be devised to make the testing process less cumbersome than that we have described here.

Giving freer rein to the imagination, may we suggest the invention of an automatic critic, a device which will scan student recordings while they are being made, and reject speech which is too far below the norm of a given level. In the classroom this is done by the teacher, though necessarily at random. In the small sections of the ASTP it was done much better by the native informant. In the laboratory, the alert student practices self-criticism as he compares his recorded repetition with the master tape, phrase by phrase. Not all students are alert, however, and the beginner sometimes fails to detect significant differences. This is a real challenge, which we believe the inventor will ultimately meet.

Returning to the level of what is possible now, we must stress again the need for a much greater variety of taped teaching material, especially at levels beyond the first year.

Something very helpful to teachers who are "playing by ear" in the laboratory would be a sound film, showing in a good deal of detail the operation of one or several long-established laboratories, at the high school and the college level.

The film just mentioned suggests the importance of in-service training. For a long time to come, teachers who have had some experience but have been feeling their way in the use of the laboratory will welcome the opportunity to see techniques demonstrated, and to compare notes with other laboratory teachers.

Today, a steadily increasing group of teachers with no previous experience is being asked to use the language laboratory. For them, in-service courses will provide an opportunity to practice the mechanics of laboratory operation away from the tensions of the classroom. At the same time (and this is most important), language teachers of many years' experience in conventional teaching may obtain needed help in adjusting to the new objectives which the laboratory was created to attain, and in using the materials now becoming available for laboratory teaching.

[2] For more detail on pattern drills and audio-lingual testing, see Edward M. Stack, *The Language Laboratory and Modern Language Teaching* (Oxford University Press, 1960), and Pierre Delattre, "Testing Students' Progress in the Language," in *Language Teaching Today* (Indiana University Research Center, October 1960).

Henry J. Hermanowicz

A critical look at

Problem Solving as Teaching Method

MANY curriculum theories for elementary as well as secondary education exemplify a primacy of method within the proposed school program. This method usually consists of some form of problem solving procedure as the basis for most, if not all, teaching-learning activities.

The purpose of this article is threefold: (a) to describe the source of problem solving as a teaching method; (b) to explore some of the significant contributions of this teaching method to education; and (c) to raise some questions concerning the applications or limitations of this method in organizing learning activities throughout the curriculum.

Dewey's Analysis

In the famous book, *How We Think*, Dewey wrote that learning is learning to think. Although Dewey recognized the existence of many ways of thinking, he insisted, "The better way of thinking is reflective thinking."[1] This reflective thinking, according to Dewey, involved a process of translation "from a situation in which there is experienced obscurity, doubt, conflict, disturbance of some sort into a situation that is clear, coherent, settled, harmonious."[2]

Dewey made a logical analysis of this concept of reflective thought by describing five phases that he considered essential functions of this particular mental process. However, he drew cautions about interpreting these phases as discrete steps following each other in a set order.[3] Furthermore, contrary to some popular journalistic interpretations of Dewey, he considered intellectual curiosity and perserverance the most important attitudes to be formed by learners. Along with reflective thought, "the desire to go on learning" was central to Dewey's concept of an educational experience.[4]

It is difficult to understand whether Dewey intended his logical analysis of reflective thought to become the Titan of method that exists in many curriculum proposals today. However, six years after the original edition of *How We Think*, the classic *Democracy and Education* was published in which Dewey stated:

While we may speak, without error, of the method of thought, the important thing

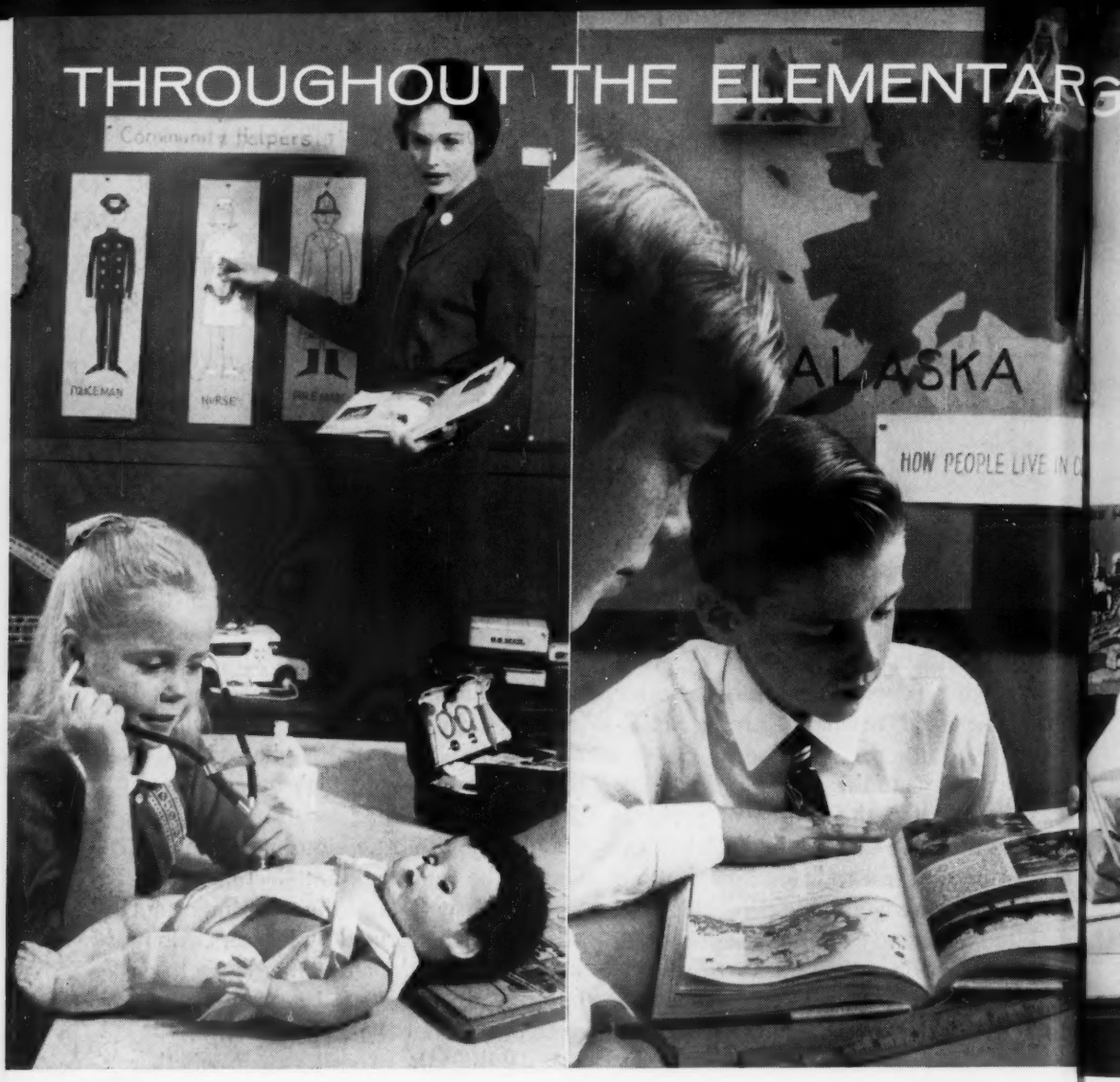
(Continued on page 302)

[1] John Dewey. *How We Think*. Revised edition. Boston: D. C. Heath & Company, 1933. p. 3.

[2] *Ibid.*, p. 101.

[3] *Ibid.*, p. 106-118.

[4] John Dewey. *Experience and Education*. New York: The Macmillan Company, 1938. p. 49.



Designed for thorough coverage of every curriculum area, The Book of Knowledge is outstandin resource in the field of Social Studies, because it presents the information required by courses of st schools across the country. Because of its unique subject arrangement, many children can use t simultaneously as they explore different aspects of the same problem. Thus it is of practical use in th method of teaching.

Because The Book of Knowledge has both an index and a table of contents, it is unsurpassed as an the teaching of index and reference skills and prepares pupils for standardized tests in reference Continuously revised and up-dated, The Book of Knowledge is THE encyclopedia for classroo library use throughout the elementary grades.

THE GROLIER SOCIETY INC., *The Grolier Building, 575 Lexington Ave., New York*

IN THE SOCIAL STUDIES AS IN EVERY CURRICULUM AREA THE BOOK OF KNOWLEDGE

THE CHILDREN'S ENCYCLOPEDIA

IS AN INDISPENSABLE TEACHING TOOL

SCIENCE
No other children's encyclopedia covers so much science material, with such careful attention to the child's level of comprehension.

MATHEMATICS
The Book of Knowledge more thoroughly covers the current approach to developmental mathematics than any other encyclopedia. Helpful articles for the teacher as well as stimulating information about the history of numbers and measurement enrich the whole math program.

HEALTH EDUCATION
From the structure and functions of the body to the use and care of athletic equipment, The Book of Knowledge implements the whole health education and recreation program.

MUSIC AND ART
In more than a thousand reproductions of famous masterpieces, in articles about the origin and development of art forms, in fascinating descriptions of musical compositions, The Book of Knowledge reinforces your music and art programs.

LANGUAGE ARTS
In richness and diversity of literature, The Book of Knowledge is outstanding among encyclopedias. Its wealth of stories, poems, biography and literature from other countries uniquely enriches the language arts program.

THE NEW BOOK OF KNOWLEDGE
20 volumes—7,922 pages—of enrichment material for classroom and library. Quick fact-finding cross index, plus concise fact entries. 11,742 illustrations (1,561 in color): big, dramatic bleed photographs, drawings, modern charts and 325 maps.

(Continued from page 299)

is that thinking is the method of an educational experience. The essentials of method are therefore identical with the essentials of reflection.[5]

Furthermore, Dewey translated his five phases of reflective thought into more pedagogical language, making them sound like a prescription for educational method. These essentials of method were described as follows:

1. That the pupil have a genuine situation of experience—that there be continuous activity in which he is interested for its own sake.
2. That a genuine problem develop within this situation as a stimulus to thought.
3. That he (the learner) possess the information and make the observations needed to deal with it.
4. That suggested solutions occur to him which he shall be responsible for developing in an orderly way.
5. That he have opportunity and occasion to test his ideas by application, to make their meaning clear and to discover for himself their validity.[6]

Interpretations

Thus, Dewey's writings opened the door to a variety of interpretations related to problem solving as a teaching method. Subsequent developments in cognitive learning theory seemed to add support to the refinement and application of this teaching method. Perhaps it was inevitable that educators would try to derive new teaching techniques by their inferences from Dewey's philosophy and from gestalt psychology.

Dewey had many middlemen who interpreted or spelled out his ideas for practical application in education. Among the more distinguished and influential interpreters of Dewey was William H. Kilpatrick. With combined intellectual and emotive appeal, Kilpatrick's ideas concerning "The Good Life" and "The Project Method" excited the imagination of many educators. In a sense, Kilpatrick was providing a do-it-yourself kit for teachers ready to react against stagnant teaching methods that existed in the schools. It is interesting to note the similarity between Dewey's problem solving and a teaching unit outline suggested by Kilpatrick. This unit, according to Kilpatrick, is an "instance of child living" which includes the following five phases:

1. The individual (or group) faces a situation. He has no satisfactory way of responding to it and is hence perplexed both as to what aspect of it he should respond and how he should respond.
2. He continues to face the situation; begins to analyze it so as to locate details that might be of help in deciding what to do and how to do it.
3. Out of his past experiences and his present analysis of the situation he makes plans for resolving his difficulty and chooses, on the basis of careful thought, the plan he prefers to try out.
4. He tries out the plan selected, revising it whenever it seems desirable to do so.
5. If the plan works, the perplexity is resolved. If the plan does not work, he may go back through the various activities again and again until some solution has been reached or else the individual abandons the situation.[7]

In addition to Kilpatrick's project method and "instance of child living," Dewey's phases of reflective thought have manifested themselves in many other educational proposals. For example, Alberty has transformed these phases of reflective

[5] John Dewey. *Democracy and Education.* New York: The Macmillan Company, 1916. p. 192.
[6] *Ibid.*, p. 192.
[7] William H. Kilpatrick. *Remaking the Curriculum.* New York: Newson and Company, 1936. p. 1-47.

thought into a type of group problem solving which he considers "the emerging concept of general method" in education.[8] Klausmeier, Dresden, Davis and Wittich outline a general pattern of teacher-pupil planning for the elementary school which is similar to Dewey's concept of reflection.[9] The implication behind these proposals appears to be that all learning evolves from the method of problem solving.

Not Confined to Teaching Method

Thorpe and Schmuller write that Dewey's insistence upon the identity of reflection and educative experience eventually altered the very concept of learning.[10] Taking a somewhat eclectic view in formulating some tentative principles of learning, Thorpe and Schmuller point out the significant impression that Dewey's problem solving has stamped upon these principles.[11]

Sometimes Dewey's problem solving has been equated with "the" method of science. Many elementary and high school science textbooks contain descriptions of "the scientific method" which bear a remarkable resemblence to Dewey's phases of reflective thought. In addition, Dewey's problem solving steps have been cited as representing the elements of design for all applied research in education.[12]

[8] Harold Alberty. *Reorganizing the High-School Curriculum.* Revised edition. New York: The Macmillan Company, 1953. p. 267-96.

[9] Herbert J. Klausmeier, Katherine Dresden, Helen C. Davis and Walter Arno Wittich. *Teaching in the Elementary School.* New York: Harper and Brothers, 1956. p. 420.

[10] Louis P. Thorpe and Allan M. Schmuller. *Contemporary Theories of Learning.* New York: The Ronald Press Company, 1954. p. 362.

[11] *Ibid.*, p. 451-63.

[12] See, for example: Stephen M. Corey. *Action Research to Improve School Practices.* New York: Bureau of Publications, Teachers College, Columbia University, 1953. p. 40.

Dewey's problem solving is the general teaching method in education. It is a significant part of learning theory. It is the design of applied research in education. It is the scientific method. This makes one wonder what other claims could be made in its name.

Questions Should Be Raised

Undoubtedly the applications of Dewey's problem solving method did much to revitalize the nation's classrooms. Problem solving as a teaching method even in its most stylized form was a procedure for improving upon the cut-and-dried classroom techniques that largely involved an assign-study-recite sequence. The new methodology also gave educators some hope for helping children learn to deal with a variety of problems and situations as an important part of their education in a rapidly changing culture. Interdisciplinary experience in dealing with significant problems is an important educational function that often gets lost in the present debate regarding curriculum improvement.

Without attempting to negate these important contributions to education, perhaps some questions should be raised concerning the omnipotence of the problem solving method. Should all learning depend upon a student's exposure to problematic situations? Does all learning involve conscious inquiry? Even if it is assumed that the better kind of thought process involves elements found in Dewey's concept of reflective thought, should these elements be translated into a general teaching method? What limitations would the use of a general problem solving method as "the" teaching pro-

Henry J. Hermanowicz *is* ***Assistant Professor of Education, Illinois State Normal University, Normal, Illinois.***

cedure impose upon learners? Does a general scientific method exist?

A General Scientific Method?

It is conceiveable that a collection of scientists might debate both pro and con the question, "Does a general method of science exist?" However, as an area of knowledge and as a human enterprise, describing "the method of science" in terms of problem solving steps must be viewed as a rather naive interpretation of the nature of science. Representing these steps (i.e., recognizing that a problem exists, stating the problem in specific terms, formulating hypotheses, and so on) as the method of science at best offers misleading information to students of science. Writing as a scientist, James Bryant Conant states:

> The usual descriptions of "the scientific method" are descriptions actually of the very limited procedure by which a person can improve a particular practical art.[13]

Other scientists have criticized the concept of a general method of science. The following is a summary of criticisms directed at this doctrine:

> First, there is not one scientific method, but several, differing certainly from field to field, and even, in many cases, from problem to problem.
>
> Second, . . . a single doctrine is misleading or meaningless unless taken in conjunction with a number and variety of examples —this can indicate limitations of the doctrine by exhibiting exceptions to it.
>
> Third, no one doctrine on the nature of scientific method, known to us, is sufficiently complete and multidimensional so as to include all others.[14]

[13] James Bryant Conant. *Modern Science and Modern Man.* New York: Columbia University Press, 1952. p. 21.

[14] Earl McGrath, Editor. *Science in General Education.* Dubuque, Iowa: William C. Brown, 1948. p. 74-75.

Cautions from Psychology

In discussing the importance of problem solving in learning, Lee J. Cronbach states that it is usually not possible to teach a definite procedure for dealing with a problem.[15] While Cronbach does not minimize the significance of having learners deal with problems, he also describes a procedure for teaching concepts which does not involve a problem solving approach. This procedure is:

1. Adequate realistic experience to provide a basis for understanding. Such understanding can come only if the experience is reflected upon.
2. Formulation of generalizations in explicit terms.
3. Application of the generalization by the student to a variety of concrete or visualized situations.
4. Consideration by the student of systematic relations between concepts.[16]

There is some experimental evidence which seems to indicate that it is possible for negative learnings to result when students learn to follow one procedure to solve a variety of problems. This possibility represents a serious indictment against transforming Dewey's phases of reflective thought into a form of teaching method even on a general level. Of course, other experimental studies have been supportive of the application of a problem solving teaching methodology. Curriculum literature often displays this supportive evidence creating unequivocally positive impressions of a problem solving teaching procedure. It is desirable for those interested in curriculum to be cognizant of the negative aspects of this teaching method.

[15] Lee J. Cronbach. *Educational Psychology.* New York: Harcourt, Brace and Company, 1954. p. 33.

[16] Lee J. Cronbach, Editor. *Text Materials in Modern Education.* Urbana, Illinois: University of Illinois Press, 1955. p. 80.

A study by A. S. Luchins indicated that students taught to follow a particular method or procedure were actually being taught not to think in their problem solving. The students in the experiment usually applied the same procedure when given a different type of problem. Furthermore, giving these students instructions to generalize a method of solution had a tendency to increase their "set" or inflexibility toward attacking and solving problems.[17]

An experiment by Schroeder and Rotter demonstrated that students who worked on a variety of problems where no single attack was successful learned to be flexible. On the other hand, those students who had continued success with one method used it rigidly even where it was incorrect.[18]

To think of problem solving as a general method may be a mistake insofar as the learners themselves are concerned. In an article summarizing recent research on problem solving as classroom teaching method, Gross and McDonald state:

> When the focus of interest in investigation has been on the general methodology of the problem solver, it has been consistently found that the subjects tend to use a variety of general methodologies.[19]

Some Curriculum Implications

The rationale behind "the problem solving method" as a classroom procedure usually is given in the form of cognitive learning theory, democratic principles, and Dewey's philosophy of instrumentalism. You might say that the teaching method of problem solving has been derived or synthesized from three or more different sources. Derivation of any specific or general classroom technique from a learning theory, philosophy, and democratic principles is a hazardous process. While the rationale behind the final educational product (in this case the problem solving teaching method) may give it connotations of intellectual respectability, neither the rationale nor the sources of derivation can make the final product reliable or valid.

Perhaps those of us in education interested in improving teaching methods should use the field of teaching itself as the basis for developing more promising teaching procedures. There is a fundamental distinction between a psychologist viewing all learning as problem solving and an educator organizing content and teaching technique in the form of problems-to-be-solved in the classroom. However, just as a psychologist develops theoretical constructs to help analyze and explain learned behavior, the educator can develop theories to help explain and gain knowledge about teaching. It is rather strange that we continue to "derive" teaching methods from a variety of sources other than teaching itself. This seems to be part of the dilemma inherent in an analysis of the problem solving method as teaching technique.

In view of the foregoing information, it may be unwise to consider all learnings as a form of problem solving in organizing content or potential learning experiences in the curriculum. This writer's professional prejudices are such that he believes that a significant function or emphasis of a school program should be to help students learn to deal with a wide variety of important problems. However, it is questionable to assume that the total

[17] A. S. Luchins. "Mechanization in Problem Solving—The Effect of Einstellung." *Psychological Monographs*. No. 54, 1942.

[18] Harold M. Schroeder and Julian B. Rotter. "Rigidity as Learned Behavior." *Journal of Experimental Psychology* 43:141-50, 1952.

[19] R. E. Gross and F. J. McDonald. "Classroom Methods: The Problem-Solving Approach." *Phi Delta Kappan* 39:259-65, March 1958. p. 261.

When you think of the 16th Annual ASCD Conference you also think of

Curriculum Materials 1961

Available now from

Association for Supervision and Curriculum Development

1201 16th Street, N.W.
Washington 6, D. C.

curriculum should be organized around problematic situations or as problems-to-be-solved.

In addition, the function of problem solving in the school program might not best be implemented in terms of "a" general teaching method. Despite the apparent built-in flexibility of "the problem solving method" as classroom technique, it has dangers of being an orthodox procedure in itself. A wide variety of teaching methods should be employed to help students develop their own abilities in decision making. The teacher's role is to help students seek relevant knowledge, understand important values, analyze possible alternatives, and project probable consequences involved in dealing with different problems. This will foster the type of critical thinking that was Dewey's original goal in emphasizing the development of reflective thought.

The trouble with using Dewey's problem solving as a step-by-step teaching method is that the application of the method can defeat the purpose for having students deal with problems. The gradual passing of the recitation as "the" method in educational practice should not result in another orthodoxy to act as a replacement. The mechanized application of problem solving as teaching method can become a thought inhibiting rather than a thought provoking device; whereas, problem solving should help develop originality and diversity in student thinking.

References

HAROLD ALBERTY. *Reorganizing the High School Curriculum.* Revised edition. New York: The Macmillan Company, 1953.

JAMES BRYANT CONANT. *Modern Science and Modern Man.* New York: Columbia University Press, 1952.

STEPHEN M. COREY. *Action Research to Improve School Practices.* New York Bureau of Publications, Teachers College, Columbia University, 1953.

LEE J. CRONBACH. *Educational Psychology.* New York: Harcourt, Brace and Company, 1954.

LEE J. CRONBACH, Editor. *Text Materials in Modern Education.* Urbana, Illinois: University of Illinois Press, 1955.

JOHN DEWEY. *Democracy and Education.* New York: The Macmillan Company, 1916.

JOHN DEWEY. *Experience and Education.* New York: The Macmillan Company, 1938.

JOHN DEWEY. *How We Think.* Revised edition. Boston: D. C. Heath and Company, 1933.

R. E. GROSS and F. J. MCDONALD. "Classroom Methods: The Problem-Solving Approach." *Phi Delta Kappan* 39:259-65, March 1958.

WILLIAM H. KILPATRICK. *Remaking the Curriculum.* New York: Newson and Company, 1936.

HERBERT J. KLAUSMEIER, KATHERINE DRESDEN, HELEN C. DAVIS and WALTER ARNO WITTICH. *Teaching in the Elementary School.* New York: Harper and Brothers, 1956.

A. S. LUCHINS. "Mechanization in Problem Solving—The Effect of Einstellung." *Psychological Monographs.* No. 54, 1942.

EARL MCGRATH, Editor. *Science in General Education.* Dubuque, Iowa: William C. Brown, 1948.

HAROLD M. SCHROEDER and JULIAN B. ROTTER. "Rigidity as Learned Behavior." *Journal of Experimental Psychology* 43:141-50, 1952.

LOUIS P. THORPE and ALLAN M. SCHMULLER. *Contemporary Theories of Learning.* New York: The Ronald Press Company, 1954.

The Importance of People

Column Editor: Prudence Bostwick
Contributor: Nora Weckler

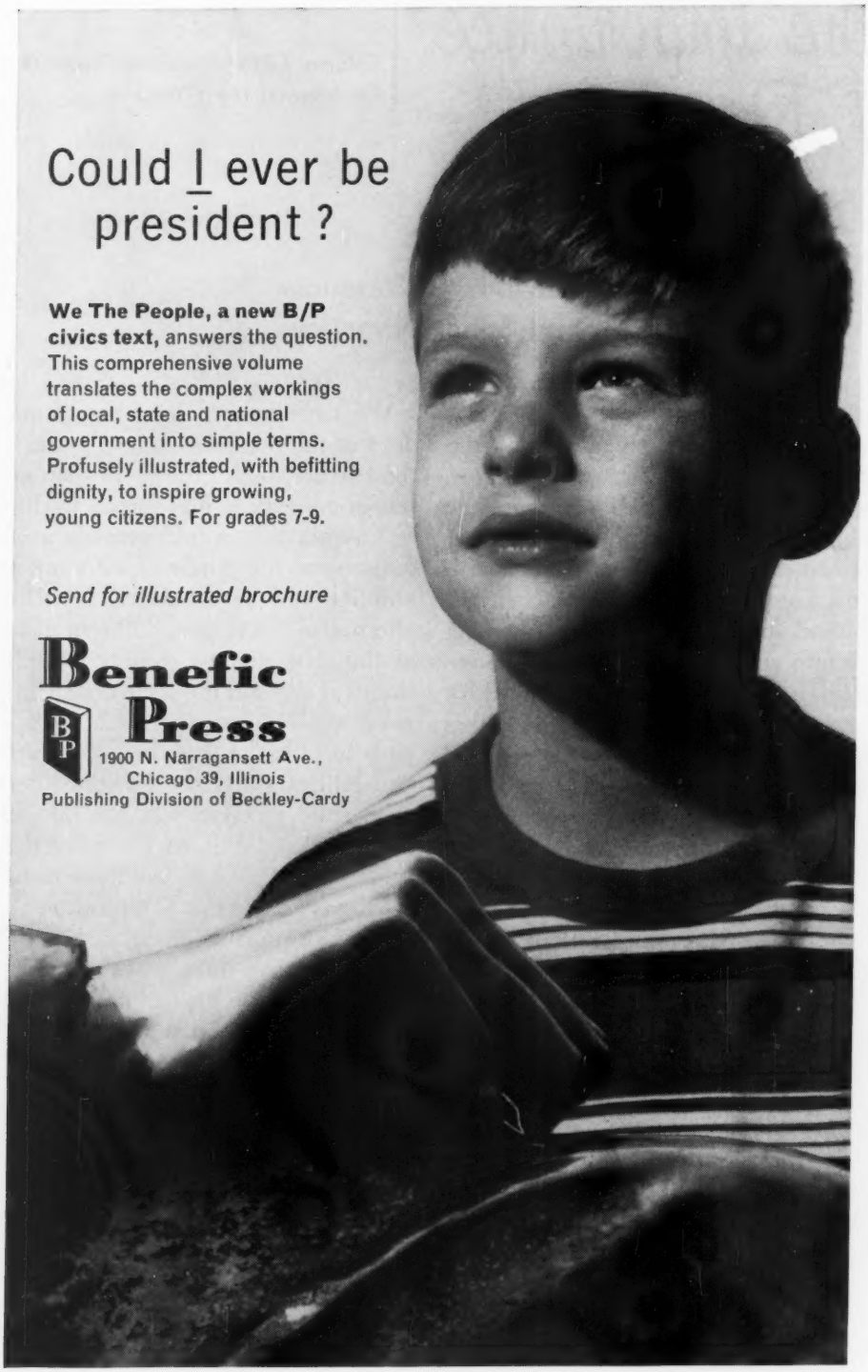
Individual Differences and School Practice

IN the United States today, every practicing teacher is acutely aware of the manifold ways in which his pupils differ. Moreover, in his preparation to enter the teaching profession, he has been duly informed about the nature of these differences and has undoubtedly been admonished about the importance of taking these into account in his teaching. However, it is my contention, overstated, of course, for the sake of argument, that rarely has the teacher been encouraged to regard uniqueness as an asset, as a characteristic to be encouraged, as something to be nurtured and built upon. Rather, the implicit, if not explicit, philosophy of the public school system, to which our teacher preparation institutions subscribe, is to regard uniqueness largely as a necessary evil, as a major tribulation with which each teacher must contend.

To help the teacher cope with the burden of uniqueness, the "enlightened" school system attempts to reduce the range of uniqueness by smaller classes selected according to increasingly refined procedures for homogeneous grouping. By so doing the system hopes that the teacher will be better able to teach a uniform curriculum in a uniform way with uniform goals for all.

We have gone a long way from the days of the one room schoolhouse. Then the teacher, with little more than a high school education, was forced to develop techniques that would provide a varied curriculum for pupils of all ages, sizes, abilities and personalities. He had no alternative but to have different members of the class doing a variety of different things at one and the same time. Children were allowed to progress at their own pace in terms of their own interests and capabilities. Certainly the education that each child received was not the best of all possible educations. I wonder, though, whether the changes we have instituted for the improvement of education are the best of all possible changes.

Rather than find ways to help the teacher improve his techniques for dealing with diversity, we have concentrated our energies and financial resources on reducing diversity. We have increasingly refined our homogeneous grouping procedures, while at the same time we have demanded more uniformities in curriculum, more standardized procedures for teaching, more standardized tests for evaluating outcomes of teaching, and obedience to an increasing number of rules and regulations to make conformity more compelling.


Could I ever be president?
We The People, a new B/P civics text, answers the question. This comprehensive volume translates the complex workings of local, state and national government into simple terms. Profusely illustrated, with befitting dignity, to inspire growing, young citizens. For grades 7-9.
Send for illustrated brochure
Benefic Press
BP
1900 N. Narragansett Ave., Chicago 39, Illinois
Publishing Division of Beckley-Cardy

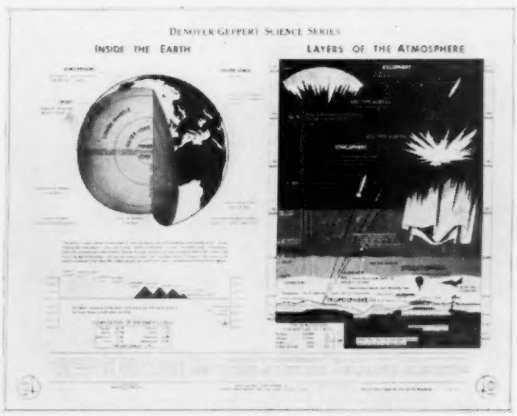
Mass Product

Our educational system has been caught in the mass production philosophy of our industrial age. We have been trying to treat children as if they were different models of cars. Each model has its own production line, and the teacher-worker is taught standardized procedures and given standardized materials designed for the model to which he is assigned. But the purpose of the different production lines is not to increase the diversity of the models, but rather to make it easier for the teacher to remold the model to fit the uniform package which is education's or society's ultimate goal.

The "slow learner" is put in a group with other "slow learners" so that the teacher can use a standardized procedure that he has learned in a special methods course, and standardized materials, specially developed for this production line, with the hope that, in the end, the pupil will emerge looking as much like everyone else as possible. The "fast learner," on the other hand, at least until recently, has not been thought to need a special production line. To achieve the ultimate uniform model was no problem for him; and since no other model was to be encouraged, the teacher's problem was to keep the fast learner occupied by giving him more of the same kind of tasks or to utilize him to do school chores that in no way represented a challenge to his unique capabilities. Today, primarily because our national concern for world leadership overshadows our internal desires for uniformity, we are rapidly developing separate production lines for the "fast learner" along with the appropriate methods courses to teach the teacher the specialized skills required. Two skills seem of paramount importance: first, that

A natural integration of science and social studies . . .

DENOYER-GEPPERT SCIENCE CHARTS



DGSII-6 Inside the Earth and Layers of the Atmosphere

In colors Each 54 x 44"

DGSI Science of Living Things
12 Charts

This series deals with life on earth: plants and animals, the human being, his food, health, and safety. Charts can be used individually or as a group. Each is related to others in the group.

DGSII Science of the Earth
12 Charts

A series new in concept concerning earth sciences. Includes such subjects as picture history of the earth, earth as a sphere, its composition, relationship to the sun, maps, time, wind systems, minerals, soils, water and conservation.

Also Coming

DGSIII Science of the Universe

See them at the meeting March 12-15! Booth 63, Write for Circulars S31a and S31b

DENOYER-GEPPERT COMPANY

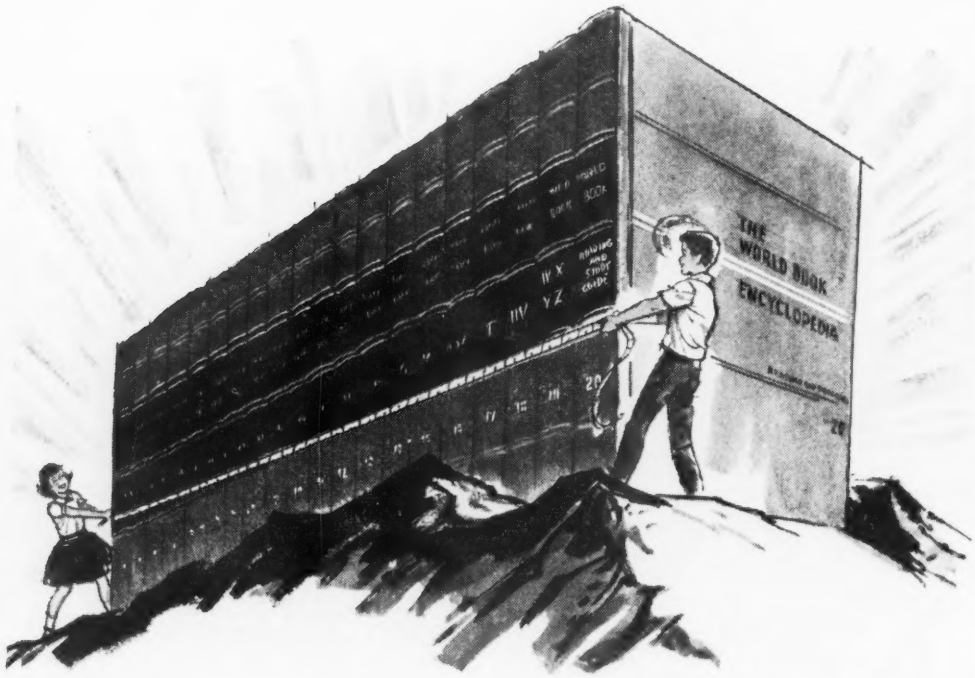
Maps, Charts, Atlases, Models, Microscopes

5235 Ravenswood Avenue Chicago 40, Ill.

THE 1961 WORLD BOOK

ENCYCLOPEDIA

by every measurement the most advanced!



Editorial vitality keeps pace with modern needs

1957		1961	
VOLUMES	19	20	VOLUMES
PAGES	Over 10,500	Over 11,700	PAGES
ILLUSTRATIONS	Over 20,000	Over 22,400	ILLUSTRATIONS
COLOR ILLUSTRATIONS	Over 3,000	Over 5,900	COLOR ILLUSTRATIONS
MAPS	Over 1,350	Over 1,725	MAPS
CONTRIBUTORS	Over 1,600	Over 2,500	CONTRIBUTORS

AVAILABLE NOW! FREE REPRINT OF 1961 WORLD BOOK "PRESIDENT" ARTICLE WITH BIOGRAPHY OF JOHN F. KENNEDY. WRITE TODAY.

Field Enterprises Educational Corporation, Merchandise Mart Plaza, Chicago 54, Illinois

the pupil not know the real reasons for being put in a special production line, for it would be undemocratic to tell him of his unique strengths and weaknesses so that he might develop realistic and challenging goals; and second, that he not cover any material or acquire any skills that are taught at a higher grade level.

I continue to be amazed by the fact that many so-called "enrichment" programs involve activities and experiences that would be more meaningful and significant to the "slow learner" and more beneficial to his ultimate welfare than they are to the intellectually gifted learner whose unique abilities to handle abstract symbols may remain unchallenged. For instance, in one school a child who loved music was prevented from joining an enrichment program in music because her arithmetic scores fell below the medium for her grade, whereas all those children who were in the upper ten percent of the group in arithmetic were required to participate in the music program even though some of them would have preferred to have learned more about mathematics.

Uniqueness

In spite of special production lines for the "slow" and "fast" learners, the teacher in the standard model production line is still confronted by problems of uniqueness. For the school system not only requires that everybody pass through a uniform curriculum but also that the pupils conduct themselves in such a manner as to make it easy for the teacher to use uniform methods to get instruction across. Thus the "good" child is *not* one who is resourceful, explorative, able to act freely on the basis of his own ideas, experimentally minded and spontaneous in his behavior; but rather—to judge by

Published January 2, 1961

ENGLISH IN THE SECONDARY SCHOOL

EDWIN H. SAUER, *Harvard University*

Demonstrates the interrelatedness of punctuation, spelling, grammar, vocabulary, literature, and composition. Special features:

- devotes a chapter to the "new grammar," or structural linguistics
- gives full attention to the renewed emphasis on composition and includes a sequential program in composition for grades 7-12
- recommends marked modification of the literary program in the high school and suggests new and more challenging literary materials
- outlines the advanced placement program in English at the Walnut Hills High School in Cincinnati, Ohio

1961, 254 pp., $3.75

--and new this spring

ISSUES, PROBLEMS, AND APPROACHES IN THE TEACHING OF ENGLISH

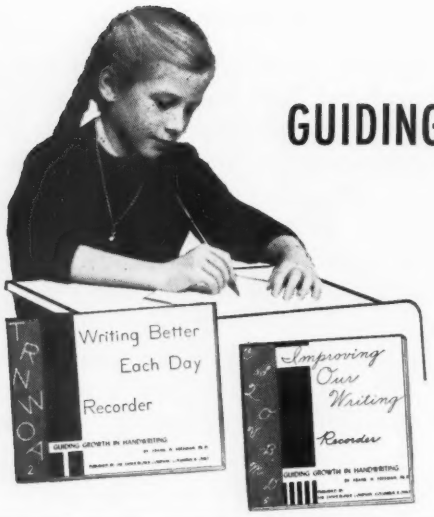
Edited by GEORGE W. STONE, JR.

Executive Secretary, The Modern Language Association of America

1961, 288 pp., $2.50 tentative (paper)

Holt, Rinehart and Winston, Inc., New York

NOW—learning to write is
EASIER, MORE FUN
MORE REWARDING



Learning to write *can* be fun for your pupils. And it *is*—with this new version of the nationally popular Zaner-Bloser system of handwriting.

The result of years of research and classroom teaching, GUIDING GROWTH IN HANDWRITING is based on the concept of handwriting as a communication art. It starts with manuscript writing in the lower grades, and progresses easily and naturally to cursive writing. Attractively illustrated throughout, it coordinates writing technique, forms of written expression and content areas. It correlates writing with language arts, social studies, health, science and other subjects. It allows

GUIDING GROWTH IN HANDWRITING

for transition from manuscript to cursive in either Grade 2 or Grade 3. It provides two professional Reference Manuals for teachers—and a separate prewriting book for the kindergarten set.

Easy for teachers, easy for students, GUIDING GROWTH IN HANDWRITING is the new, easy, practical way to teaching and learning better penmanship.

Write for FREE full-color brochure

Zaner-Bloser

612 N. Park St., Columbus, Ohio
Dept. EL

reporting practices and administrative codes—prompt, obedient, dependable, courteous, thrifty, and appropriately attentive to "personal cleanliness, neatness, and standards of dress and appearance."

The demands for behavioral conformity are even supported by state legal codes that make it a crime not to "submit to the authority of the teacher and the school."[1] The implications of such codes are obvious. According to them, a pupil is held responsible for his personality, in spite of a wealth of psychological evidence to the contrary.

The behavioral deviant acts the way he does because of forces over which he has no control. Usually he perceives the situation as threatening and can do nothing but defend himself against the threat. Since punishment, whether physical or psychological, increases the threat and therefore the defenses, it is worse than ineffectual. To change the manifested behavior, the psychological situation must be changed. A few "enlightened" schools are beginning to respond to the accumulated evidence concerning the dynamics of personality by using the timeworn procedure of instituting another production line. Social adjustment classes are cropping up to handle the nonconformist, an individual who may well be the resultant of the school's own demands for uniformity.

To cite but one example of how demands for uniformity create massive problems in individual differences, I was recently told by a member of the central attendance office of a large school district that, if classes in physical education at the junior and senior high school were made optional, there would be a 50 percent reduction in the attendance problems of the district. In these classes there are more than the usual demands for con-

[1] California State Education Code, Sec. 10851.

forming behavior. Pupils must not only learn the same skills at the same time—skills as meaningless to the present life and future activities of the average pupil as soccer, basketball and baseball—but they must undress and shower in public and put on the same uniform. If physical education is so important that in California, at least, it is required more consistently than is English, the requirements ought to be sufficiently flexible to permit a particular individual's deep-seated feelings about exhibiting his body or his physical ineptness to the public gaze to be respected. Surely a choice of activities with a choice of costume is not beyond the limits of teachers' capabilities or of educational budgets to provide.

Diversity

The principle of diversity of activity within a class need apply not only to physical education. It is equally meaningful and probably equally feasible in any subject matter area and at any grade level. But to put the principle into practice will require changes in our administrative procedures and changes in the role traditionally expected of teachers. Red tape and rigid rules and regulations both for teachers and pupils will have to be reduced to a minimum. Standardized textbooks will need to be replaced by a wide range of learning materials. In the old days, there was such a shortage of published materials that uniform textbooks were a necessity. Today, although there is a tremendous diversity of printed material, the teacher is frequently not allowed to take advantage of it. If he could, he might see the possibility of allowing individual differences to flourish in the classroom.

He might be allowed to discover that a teacher does not have to stand in front of a classroom and give out uniform content according to a standardized plan. In a history class, he might allow a girl very much interested in clothes to study change through explorations of fashions, or a boy very much interested in science to study change through significant contributions to technology, still another to study political conflict, while someone with a practical bent could make models showing changes in living conditions, and so on. Since each pupil would be working individually or with a few others, the teacher would be free to offer assistance when needed and to encourage each pupil to develop his potentialities to the utmost. Each child could develop self-respect because he would be making a unique contribution to the whole. He would not have to suffer affronts to his ego from continual comparison with his age-mates. I do not think I am being too idealistic or unrealistic, for I have seen a

a new idea in social play

Vigorous, active, **physical** play . . . free-wheeling **imaginative** play . . . now in PLAYMOBILES that draw children into irresistible **social** play! Playmobiles are new: push-pull, ride-in, ride-on vehicles 4, 6 or more children share, enjoy together. STATION WAGON holds driver, 3 passengers. . . . BOAT seats captain and crew. . . . FIREFLY carries children on his back! Heavy duty construction, rubber tired wheels and bumpers. Your teachers will want to know more about Playmobiles. Write now for free catalog. Dept. L-261.

Box 414
Detroit 31,
Michigan

mor-pla

first grade teacher "teach" reading to a class of 50 children by encouraging the pupils to teach each other. While they learned at various rates, the teacher was free to help those with special needs or problems or even to talk to visitors.

With the flexible program I envisage, there would be no need for special classes for "exceptional" children. Within the walls of a single room, each pupil would be encouraged to think for himself and to do for himself, to be creative, to observe accurately, to test new ideas and to develop judgment based upon his own experience. He would learn how to have freedom and how to use it constructively to grow and develop optimally, and also how, within this freedom, to listen and to learn from others. He would learn how to live with and extend his own uniqueness; and at the same time live with and grow through the uniqueness of others.

—NORA WECKLER, *Associate Professor of Psychology, and Chairman of the Department, San Fernando Valley State College, Northridge, California.*

Teaching Machines

(Continued from page 277)

stimulus patterns. Discrimination is developed by rewarding only the correct response.

What impact can we expect the use of teaching machines and auto-instructional programs to have on education during the next ten years? One answer has been given by the writer and Robert Glaser in the concluding chapter of our recent book, *Teaching Machines and Programmed Learning.*[2] Our conclusions were as follows:

Teaching machines and programmed learning can have a major impact on education. Their use can effectively and dependably guide the student's learning-by-doing as he proceeds, as rapidly as his abilities permit, through carefully pretested instructional programs. It can thus be made economically feasible to provide every student with many of the benefits of a skilled private tutor, since auto-instructional materials can anticipate and be responsive to his needs for mastering each aspect of a subject matter. Not only do programmed materials themselves thus have the potential for producing much more efficient learning than has hitherto been generally possible, but their wise use should make possible the much more constructive use of the teacher's talents.

The basis for consistent improvement in educational methods is a systematic translation of the techniques and findings of the experimental science of human learning into the practical development of an instructional technology. To achieve the full benefits inherent in this concept, instructional materials and practices must be designed with careful attention to the attainment of explicitly stated, behaviorally defined educational goals. Programmed learning sequences must be developed through procedures that include systematic tryout and progressive revision based on analysis of student behavior.

The rate at which the methods of programmed learning may influence the practices, staff and facility requirements of school systems is difficult to predict. However, it seems likely that we can look forward to significant revisions in concepts of classroom practices and teacher functions. We also need to foresee and plan for the time when, because of increased instructional effectiveness, a much more advanced range of educational content can be included in the precollege curriculum.

[2] National Education Association, The Department of Audio-Visual Instruction. *Teaching Machines and Programmed Learning.* A. A. Lumsdaine and Robert Glaser, Editors. Washington D. C.: the Department, 1960. p. 572.

Curriculum Developments

Column Editor: Arthur Hoppe

Teaching Methods and Devices

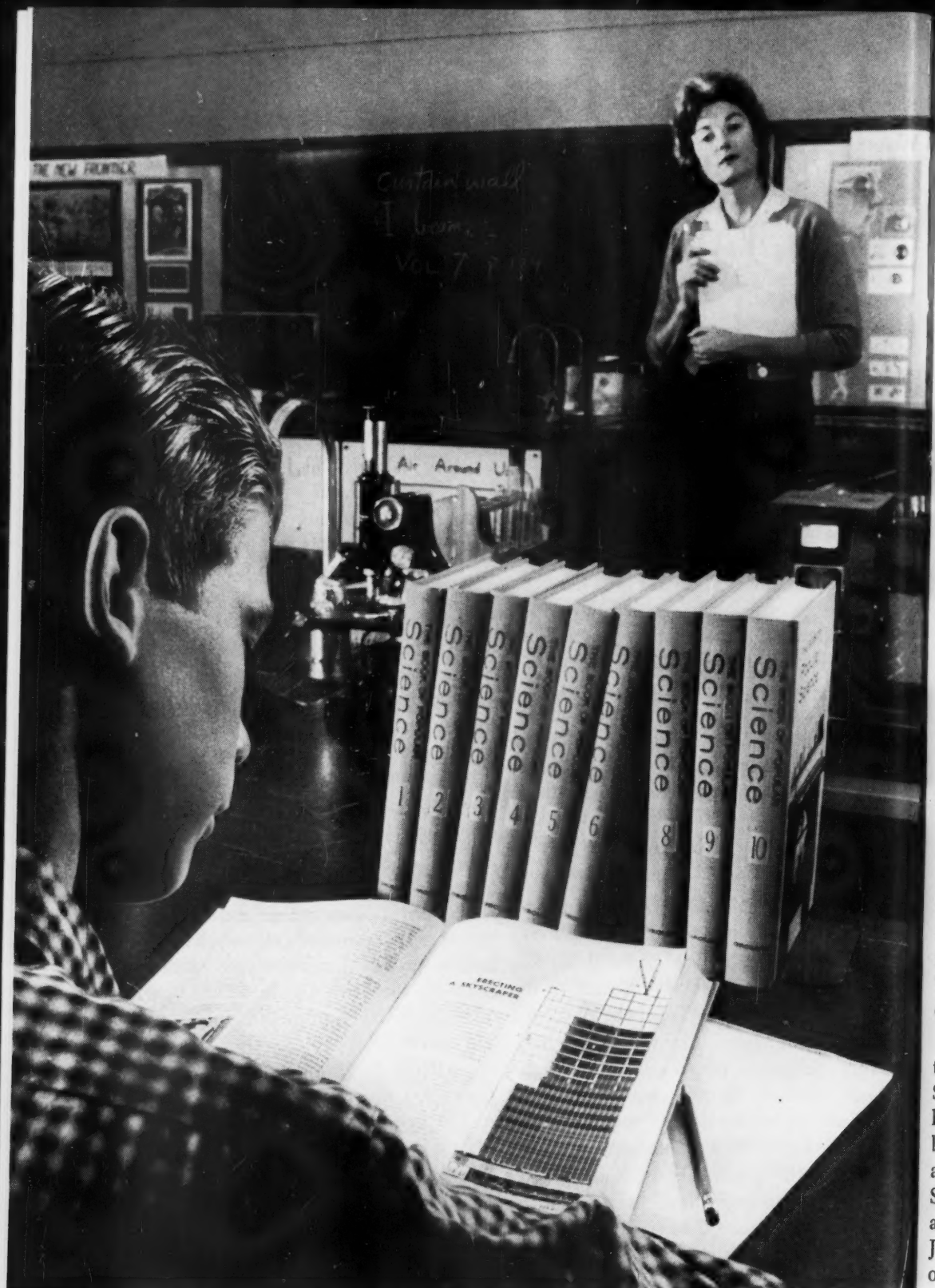
As teachers consider the theme of this issue of *Educational Leadership* it must be abundantly clear that the subject areas currently receiving greatest attention are science, mathematics and language. The most glamorous devices are television, language laboratories and teaching machines. There is much danger that overconcern in these areas and relative neglect of others may produce a lopsided curriculum and hence lopsided people. Concern about this danger is the responsibility of everyone in the school community; but it is the unique function of professional educators, and particularly curriculum workers, to be sure that the community in general understands the possible alternatives and the likely consequences of decisions in these instructional matters.

Teachers and students of science may look for special help of several kinds. Robert Carleton, Executive Secretary of the National Science Teachers Association, has announced a new organization, Future Scientists of America, for high school students throughout the nation. This new extraclass activity group was initiated by science educators, is chartered by the parent body and should strive to cooperate with all present youth programs in science. *The FSA Centrifuge* is a quarterly newsletter which describes activities of local chapters and recent scientific developments of interest to club members.

The NSTA is conducting a nationwide study of science programs in elementary schools. The search will center on experimental evidence of success in curricular planning: plans, procedures and accomplishments will be highlighted. Suggestions for in-service education will be carefully appraised and the more appropriate ones recommended for more widespread adoption. Careful examination of science programs in the elementary school is a normal addition to the current emphasis on science in junior and senior high schools. The report of this research will be eagerly awaited by school people.

The Science Materials Center of the Library of Science, New York, has published a paperback volume: *Laboratories in the Classroom*. It contains many tested classroom methods for elementary and secondary teachers who want their students to "learn by doing" in science. The necessary equipment and supplies are carefully specified. The suggestions come from 27 prominent educators and cover a wide range of topics. As long as the first printing lasts, science teachers may secure a copy free by writing Naomi Alt, Science Materials Center, 59 Fourth Avenue, New York 3, New York.

High school biology may soon take on a new look. Some 14,000 students are currently using new experimental ver-



THE BOOK OF POPULAR SCIENCE IS THE ONLY GENERAL PURPOSE SCIENCE REFERENCE WORK FOR GRADES SIX THROUGH TWELVE

**The Book of Popular Science is double-starred in the AAAS Science Book List; it qualifies for purchase under Title III NDEA

Published by The Grolier Society Inc. • 575 Lexington Avenue, New York 22, N. Y. • Publishers of The Book of Knowledge

sions of a tenth-grade biology program prepared by 69 high school teachers and research biologists. They did this work at a (1960) Summer Writing Conference of the Biological Sciences Curriculum Study, sponsored by the American Institute of Biological Sciences, at the University of Colorado, Boulder.

CIBA Pharmaceutical Products, Incorporated, at Summit, New Jersey, publishes once a month a large wall newspaper called "MARK." Through very interesting pictures and clear descriptions, about eight important events in science are depicted monthly in such fashion as to stimulate broader interests in science among students in school. Single copies are available free from CIBA, P. O. Box 1627, New York 17, New York.

The Florida Foundation for Future Scientists, located at the University of Florida, Gainesville, has made available to high school students in the state small grants to further their special projects for science fairs. The money is expected to encourage students by helping defray costs for science project equipment and supplies.

Community resources are where you find them! The Community High School at Napierville, Illinois, offers an Honors Science Seminar with guest speakers from nearby North Central College. They are presenting 22 lectures on nuclear physics.

The Curriculum Services Center of the Wilmington (Delaware) Public Schools provides eight "instructional loan kits" for teachers. Composed mainly of books at various reading levels, film strips and pictures, the kits treat such topics as St. Lawrence Seaway, World We Live In, and The Sea. There are also Senior and Junior Space Kits. These can be mailed out of the Central Office, but individual schools are encouraged to assemble kits of their own, utilizing their own resources and adapting to their own needs.

Theodore Andersson of the University of Texas, directed the first conference of state supervisors of modern foreign languages, a two week session last summer at the George Washington University. It is interesting that two years earlier only four states had such supervisors; last year there were 38, and 32 of them attended the Washington meeting. They organized the National Council of State Supervisors of Foreign Languages and agreed to hold annual meetings. These leaders are bent on de-emphasizing the traditional grammar-translation methods which tend to develop into academic drudgery, in favor of learning experiences that are enjoyable and rewarding to youngsters. They also favor more attention for the less common languages.

The alert teacher travels to keep up with modern youngsters. Joseph Hanlon, of the NEA, reported that in the summer of 1960 some 1,500 teachers traveled into 70 different countries via 40 NEA-sponsored tours. This they did sometimes for college credit but always for guided study of the history and culture of the various nations. The actual firsthand experiences in other lands, the color slides taken, the collected souvenirs, all enable teachers to bring their classes "alive" with flavor and excitement that can hardly be gained from reading books alone. This kind of experience is good for every teacher; but for teachers of foreign languages particularly, it is virtually indispensable.

Under the direction of Charles E. Bish, and with financial support from the Carnegie Corporation of New York, the NEA and NASSP have jointly spon-

New and exciting materials to improve Spelling and Reading...

MORTON BOTEL, Ed.D. COORDINATING EDITOR
Assistant Superintendent and Reading Consultant
Public Schools of Bucks County, Doylestown, Pennsylvania

An Individualized Spelling Program for All Grades:
THE MULTI-LEVEL SPELLING PROGRAM

PRIMARY MULTI-LEVEL SPELLER AND FIRST DICTIONARY
MULTI-LEVEL SPELLER, Gr. 3-12 (Paper)
MUTI-LEVEL SPELLER, Gr. 3-12 (Text)
MULTI-LEVEL SPELLER GUIDEBOOK
MULTI-LEVEL SPELLER STUDENT RECORD BOOK

High Interest — Easy-to-Read Books for Elementary and Secondary Grades:
THE INTERESTING READING SERIES
(Paper Bound and Text Bound)

TEN GREAT MOMENTS IN SPORTS
MARY ELIZABETH AND MR. LINCOLN
BURIED GOLD
GREAT MOMENTS IN AMERICAN HISTORY
THE MYSTERY OF BROKEN WHEEL RANCH
ADVENTURE IN SPACE
FIRST MEN IN SPACE
(OTHER TITLES IN PREPARATION)

An Individualized Activity Book:
MULTI-LEVEL READING ACTIVITIES
(The activities book can be used with the Interesting Reading Series or with an individualized reading program.)

A Practical How-to-Do-It Manual for Teachers of Reading at Every Grade Level:
HOW TO TEACH READING

PENNS VALLEY PUBLISHERS, INC.
102 South Allen Street • State College, Pennsylvania

sored a program of particular interest to curriculum workers: the Project on the Academically Talented Student. Several reports have appeared as products of this endeavor. These reports have stemmed from various sources, but usually they are the by-products of carefully planned work conferences to which recognized specialists in the areas of concern have been invited. Furthermore, they enjoyed the active support of the parent professional body, such as the National Council of Teachers of Mathematics, the National Association of Science Teachers, the National Council for the Social Studies, and the Modern Language Association of America.

The conferees were also aided by highly qualified consultants in each area. A quotation sets the defense for the entire series: "There is nothing so unequal as the equal treatment of unequals." [1] This is not to suggest that the average or the slow student is ever to be neglected. A democratic nation cannot afford to make less than its best effort for *all* students in school, and that includes the talented.

In *Schools of Tomorrow—Today,*[2] Arthur D. Morse has compiled brief descriptions of educational experiments of several kinds, including team teaching, television, teacher aides, ungraded classes, schools within a school, and teacher selection and preparation. The report was prepared for the New York State Education Department.

Schools, teachers and locations are clearly identified along with their major purposes and procedures. For the busy

[1] Marian Scheifele. *The Gifted Child in the Regular Classroom.* New York: Bureau of Publications, Teachers College, Columbia University, 1953. p. 44.

[2] Arthur D. Morse. *Schools of Tomorrow—Today.* Garden City, New York: Doubleday and Company, 191 p. $1.50.

Wiley BOOKS

INTERNATIONAL EDUCATION IN PHYSICS

Edited by Sanborn C. Brown, *Massachusetts Institute of Technology, and* Norman Clarke, *The Institute of Physics and The Physical Society, London.*

This book, a collection of the facts, opinion, and ideas exchanged during the conference held in Paris last summer, is the first attempt made to look at the problem of physics education as a whole, and it ranges from physics education in high school through that on the graduate level as found in all the major countries of the world. A Technology Press Book, M.I.T. *1960. 208 pages. $4.50.*

PHILOSOPHIES OF EDUCATION

Sketches of Some Contemporary Viewpoints on Education Based on a Series of Education Television Programs Produced for the National Educational Radio and Television Center.

Edited by Philip H. Phenix, *Columbia University.* Each philosophy is presented by a leading exponent of that position, and it is accompanied by an introduction putting the position in historical perspective, and by illustrative materials showing how the position might work out in practice. Each philosophy concludes with specific practice. *1961. Approx. 128 pages. Prob. $1.90.*

Send for examination copies.

JOHN WILEY & SONS, Inc.
440 Park Avenue South
New York 16, N.Y.

A message from Bennett Books . .

The lack of articulation in many schools is serious . . . Textbooks can materially aid in the solution of this problem.

In his recent extensive study of education in today's American junior high schools, famed Dr. James B. Conant found that lack of articulation among educators, schools and school systems is one of the more serious problems facing educators. With the present-day fluidity of our populace and the increasing scope of study offered the student, students who must attend several schools before gaining the coveted diploma are facing an increasingly difficult situation.

Educators and educational systems must work toward a more homogeneous curriculum in each school and among different school systems. There should be less separation and distinction of courses in each school also, so that a more related educational program is provided the student. Classroom textbooks can achieve a large part of the objective.

One of Chas. A. Bennett Co.'s objectives is to provide administrators and teachers with textbooks that are sequential, articulated and thorough. For example, a home-making student can advance in a continuous, well-planned program from grade 7 to grade 12 with the complete series of Bennett Homemaking Texts.

In the Industrial Arts, a series of Bennett Woodworking Texts co-ordinate study from grades 7 to 12. Unified, related study materials are available for mechanical drawing and graphic arts students.

These efforts of Chas. A. Bennett Co. to provide a stronger, more unified textbook program will materially aid educators and administrators as they face the problems of articulation in American junior high and high schools.

Your inquiries and comments will be appreciated.

Chas. A. Bennett Co., Inc.

8451 Duroc Building, Peoria, Illinois

"Textbooks Are The Second Most Important Factor In Education"

educator and particularly for the curriculum worker, this publication presents a valuable summary of certain experimental programs and a source book of names and places to investigate for further information.

National Library Week will be observed from April 16-22 this year. A school kit of very real help to teachers and librarians is again available at the nominal cost of one dollar. It includes a large poster, a streamer, a four-color mobile, book marks, and many suggestions for programs. The observance is sponsored by the National Book Committee, Incorporated, in cooperation with the American Library Association. Send orders to: School Kit, National Library Week, P.O. Box 365, Midtown Branch, New York 18, New York.

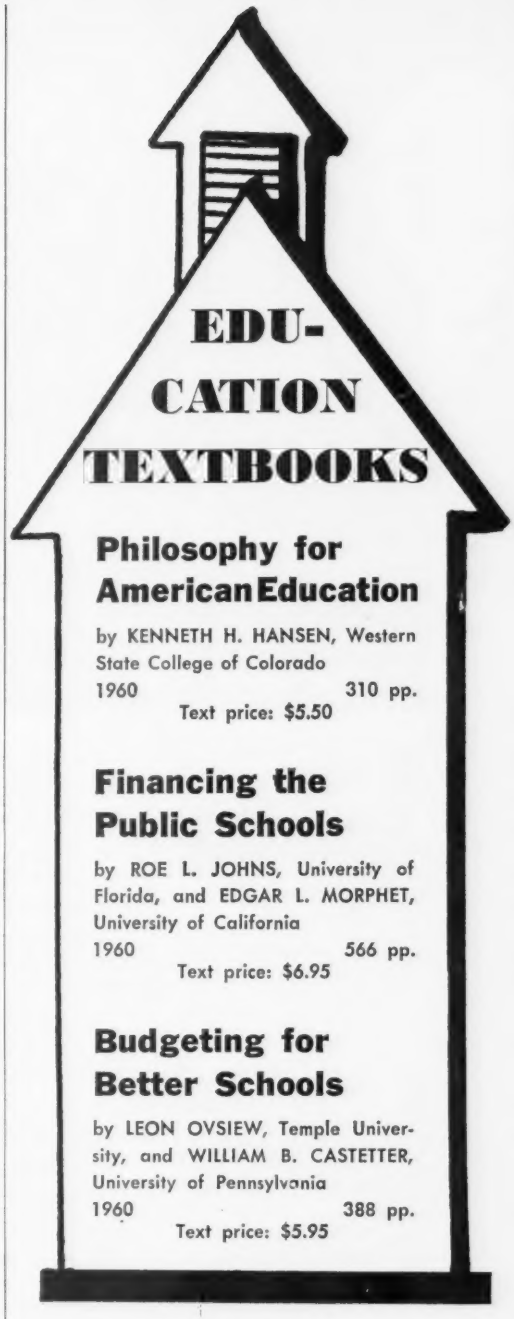
New Bulletins

San Diego County. *A Handbook of Independent Activities to Promote Creativity in Children.* San Diego: Department of Education, October 1959, 73 p.[3]

The Primary Teachers Club of San Diego County produced this bulletin in an effort to suggest things children could do "on their own" and with very little teacher preparation or supervision. At the same time, each activity must require productive thinking *and* reaching toward the unknown; each must provide for freedom of expression, use of individual talents and personal satisfaction.

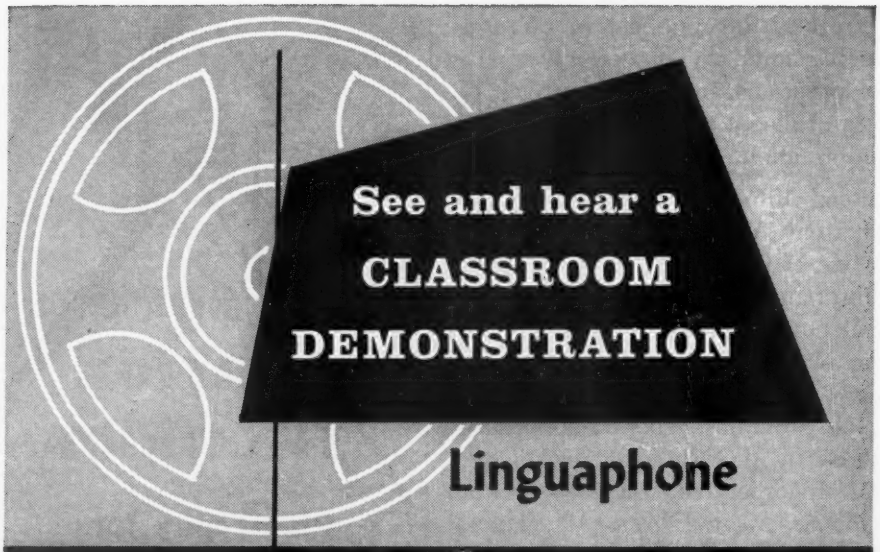
The activities described here are not just busywork. They fall into eight areas, including such topics as bookmaking, making games and self-service centers. Along with each description of an ac-

[3] Dr. A. L. Butler, of Indiana University, assisted the column editor in the appraisal of this bulletin.


EDU-
CATION
TEXTBOOKS
Philosophy for American Education
by KENNETH H. HANSEN, Western State College of Colorado
1960 310 pp.
Text price: $5.50
Financing the Public Schools
by ROE L. JOHNS, University of Florida, and EDGAR L. MORPHET, University of California
1960 566 pp.
Text price: $6.95
Budgeting for Better Schools
by LEON OVSIEW, Temple University, and WILLIAM B. CASTETTER, University of Pennsylvania
1960 388 pp.
Text price: $5.95

For approval copies, write: Box 903, Dept. EL

PRENTICE-HALL, Inc.
Englewood Cliffs, New Jersey



NEW ELECTRONIC LANGUAGE-TEACHING TAPES

Linguaphone School Tapes are available in The 4 Most Popular Languages:

Western Hemisphere Spanish, French, German, and Russian.

The Linguaphone Language Program is qualified under the provisions of the National Defense Education Act.

In your own school, inspect this latest development in audio-visual language training... outgrowth of Linguaphone's experience in over 18,000 schools, colleges, and universities.

Here at last is a teaching tool that helps students learn more... faster. For here is a new kind of conversational language program that makes language-learning more enjoyable, language-teaching much easier.

Linguaphone's unique combination of *native* linguists and modern electronic devices makes possible tape and disc recordings of such unusually fine quality that every subtle nuance of pronunciation, diction, phraseology, and accent is clear and understandable. The *synchronized* Tapes and Discs, together with up-to-date Workbooks (by Dr. Theodore Huebener) and student and teacher Manuals, comprise the ONLY COMPLETE language study program available today.

Such an achievement cannot be described; it must be *seen and heard.* That is why we invite you to evaluate this new Linguaphone School-Tape Program in your own classroom.

For descriptive literature and further information about a classroom demonstration free of all obligation, simply mail coupon or write.

LINGUAPHONE INSTITUTE, Dept. SD-385-021, Radio City, N.Y. 20, N.Y.

LINGUAPHONE INSTITUTE, Dept. SD-385-021, Radio City, N.Y. 20, N.Y.

Gentlemen: I am interested in receiving literature about the Linguaphone School-Tape Program and would like more information about a classroom demonstration. No obligation, of course.

Name.....

Position.....

School Name.....

School Address.....

tivity, several examples are given and the related subject areas are identified.

This bulletin contains a wealth of ideas for busy primary teachers. The activities are based on modern concepts of learning, suited to a wide range of individual differences, and conducive to free and creative expressions of many kinds.

Los Angeles City Schools. *It's Worth A Visit.* Publication No. SC-460. Los Angeles: Division of Instructional Services, Audio-Visual Section, 1960. 92 p.

Only those field trips or journeys which are directly related to *secondary* school curriculum appear in this revision of the catalog which originated in 1955. It is an elaborate, thoughtfully arranged and carefully indexed catalog. Rules and policies, names and places, planning arrangements and educational procedures are clearly specified. The producers of this catalog underscore the importance of planning, supervision and evaluation of all trips if they are to have maximum value.

Field trips often enable youngsters to clarify many abstract and hidden factors which operate in their daily lives, even in somewhat familiar elements of their communities. By providing first-hand contacts and vital personal experiences, with proper guidance, trips and journeys can lend meaning and excitement to readings in books and subjects in school. This bulletin will enhance such possibilities for better learning in Los Angeles schools certainly, and possibly by suggestion in many other schools where trips are not yet common parts of the educational program.

Illinois Superintendent of Public Instruction. *Block-of-Time Scheduling Practices in Illinois Junior High Schools.* Springfield, Illinois: Office of the Superintendent, Research Department, 1960, 35 p.

Several states have recently studied block-of-time and core type classes in their schools. This report from Illinois is a welcome addition to the growing body of data. The survey described in this bulletin was made possible through the cooperative efforts of four state groups: the Department of Public Instruction, the Junior High School Association, the Junior High School Principals Association, and the Teacher Placement Office of the University of Illinois.

Inquiries were sent to all of the 278 junior high schools in the state. Replies were received from 158 schools, and 97, or 61 per cent, reported having block-of-time classes. As usual, the great majority occurred in grades seven and eight and in the larger schools. The study included specific information on how

NEW
ELEMENTARY
SCIENCE
CHARTS

Magnetism
Sound
Electricity
Light
The Story of Rocks

WRITE FOR BROCHURE

EATON SCIENTIFIC CORPORATION
119 SOUTH ROSEMEAD BLVD.
PASADENA, CALIFORNIA

programs were initiated, the nature of instruction, reporting pupil progress, guidance practices, types of core, preparation of core teachers, and chief obstacles to development of core programs. Responses were secured from both principals and teachers.

The Illinois report reflects a sense of the importance of core-type classes for the junior high school. Indeed, it suggests that this type of class is likely to increase still further to provide the common learnings needed by junior high youngsters. At the same time, it underscores the need for urgent attention to the preparation of junior high school administrators and teachers in general and core-type teachers in particular.

New York State Education Department. *Exploring Space,* a Resource Unit for a Course in Physical Science. Albany: Bureau of Secondary Curriculum Development, 1957. 94 p. (Price not indicated.)

Very few topics in the education of youngsters today have the power to stimulate the imagination to the extent that the topic of this resource unit does. At the same time it offers many opportunities to study basic laws of science in several fields and to see the interrelationships among them. As might be expected, special emphasis falls to astronomy and radio astronomy.

Three sections of the unit include: (a) The Earth's Atmosphere, (b) Exploring Space from the Earth, and (c) Exploring Outer Space. Numerous activities are suggested to explore the principal scientific concepts involved in space study. Individual aspects of the total unit lend themselves well to separate study, e.g., "Exploring Space from the Earth." General goals are clearly stated in the beginning, and a Preteaching Checklist should be of special value to teachers using this material.

The unit closes with detailed lists of equipment and supplies, useful films, and readings. The references were carefully chosen for their scientific accuracy and value, in order to help youngsters recognize the limitations of certain science fiction writings which often permit imagination to disregard established fact or inescapable laws of nature. The entire work is profusely illustrated. It should prove to be of practical value to teachers of science in our emerging space age.

Machines and Learning Process

(Continued from page 283)

4. Can a program of instruction be arranged in the school system which encourages each student to proceed at a rate appropriate for him, kindergarten through twelfth grade? Though this idea is accepted by many at the verbal level, the authors are unaware of any school system that actually accomplishes it well. And there is no point in introducing machine instruction unless it is accepted in practice. Children can be denied the opportunity for using appropriate levels of programmed material, as, for example, many of the more proficient sixth graders are now being denied use of any of the required textbooks or other instructional material used in the seventh grade.

Little doubt exists that relatively inexpensive machines and programs in such fields as spelling and arithmetic throughout the elementary school level will soon be available. If the producers and manufacturers cannot sell them to the schools directly, they will sell them to parents, just as encyclopedias, dictionaries, and non-textbook materials are now sold.

Letters to the Editor

Role of Director of Instruction

Salt Lake City, Utah
November 30, 1960

Editor
Educational Leadership

Dear Sir:

Glen Hass, in "The Role of the Director of Instruction" (*Educational Leadership*, November 1960), has written a paper that should be of value to a new curriculum coordinator or to a superintendent and administrative staff who are adding this position to the system but are unfamiliar with its responsibilities. Most of those who have done work of this kind, however, will find that the proposals made are familiar to them, and many are performing most of the functions described, but the most difficult problems and unresolved issues in defining the position are omitted.

While it is true that there is little literature devoted specifically to this position, most of the rather voluminous literature on supervision is pertinent and surprisingly similar in point of view, particularly that published within the last twenty years or so.

It is not altogether clear, however, either from research or practice, whether a leader's "perception of his role governs his action" or the reverse; that is, whether behavior defines the role. There is considerable disagreement, also, with the notion that "the position of curriculum director is both administrative and supervisory." A group of Wisconsin coordinators with whom I have worked ranged all the way from those who saw the position as primarily an administrative one to those who perceived it as one carrying no administrative authority or responsibility, and functioned accordingly. It is true that many in such positions have administrative functions (with concomitant administrative authority over those with whom they work) and consider it desirable. It is also true, however, that some believe the position should be consultative only and that the possession of authority is a handicap in work which is essentially one of service.

While the seven areas of responsibility listed are probably widely accepted, the word "coordinating," which appears three times in the list, is of uncertain meaning. I have been a curriculum coordinator, and I still do not know what the term means. One of the problems I had (perhaps in role definition) was that many seem to perceive the term as implying some degree of uniformity or similarity in curriculum content and organization, and I could not see it that way. It is possible to have central personnel and committees for the exchange of information, ideas, and practices, without expecting uniformity in textbook selection and other important curriculum decisions.

Rand McNally

announces publication of

THE BORCHERT-McGUIGAN GEOGRAPHY SERIES

Created to make geography a fascinating, meaningful study of our lives, our times and our land.

This series emphasizes the geographic concepts and skills important for today's students.

THESE GEOGRAPHIES TEACH STUDENTS TO UNDERSTAND

- **What they see.** How does the world look? How much can you tell about the geography of a place just by looking at it? You can tell a great deal if you know what to look for. One function of the Borchert-McGuigan series is to teach children to understand what they see. By observing and interpreting landscape they develop a skill they will need in order to develop an understanding of the world in which they live.
- **The world's pattern of urbanization.** This is an understanding of major significance to United States students because our country is now 90% urban, 10% rural.
- **The international problem of adequate moisture and water.** Here are new maps which show the effective amount of moisture available, not merely, the misleading total amount of rainfall-in-inches.

  In these texts the geographically critical problem of the world's great need for water: for power, transportation, industry, urban living, and many other uses is stressed.
- **Our freedom and our heritage as aspects of the geography of our land.** Here are major themes which animate the study of geography, give it historical perspective, and lead to a "larger" perspective still: "What makes our country strong and great?"

This new series makes your teaching easier and appropriate for our times because it contains:

- A meaningful approach to geography
- A striking, effective design format
- Completely new maps
- New picture-review sections called "Seeing the Big Picture"
- New picture-maps
- A field study approach — more exciting in its presentation
- More basic geography

To help you, the series has been

- Pre-tested by practicing teachers
- Tested for readability
- Written by a geographer and an elementary classroom teacher

To help you, there are

- A teacher's edition for each text
- A correlated map and globe program
- Filmstrips
- *Handbook of Map and Globe Usage*

For a descriptive brief on the Borchert-McGuigan Series, write:

EDUCATION DIVISION
RAND McNALLY & COMPANY
P. O. BOX 7600 • CHICAGO 80, ILLINOIS

While it is true that some directors of instruction do not include all grades, all instructional leaders, testing of instructional procedures, the budget, or the selection of principals or supervisors, in their work, some do. A thorny problem lies here: if one has a hand in hiring personnel, should he not also have a hand in firing them; and if he does, can he be perceived as a "service" person if he takes part in hiring and firing?

Agreement on Goals

"Finally, the director of instruction should be constantly active in assisting the staff to reach agreement regarding goals." I submit that this is relatively easy, if goals are stated generally enough, and rather unimportant. Is agreement so necessary, anyway? People can agree on goals and disagree violently on achieving them, and usually do, while people who disagree on their goals might be able to agree on means they are willing to use. Here, also, diversity may be more important than uniformity, as Hass suggests later on. This may mean, however, that there might not be any such thing as "the" instructional program, but many. The extent to which this is permissible and desirable is one of the curriculum worker's knottiest problems. Agreement on this point seems difficult enough within a group of curriculum specialists; it seems almost impossible for supervisors, teachers, administrators, and laymen to agree on it.

One of the most difficult parts of the attempt at a job analysis is differentiating between the functions of the coordinator and those of the building principal. Perhaps too many principals consider their school an autonomous kingdom, but you cannot have the different schools doing "different planning in different ways" without direction and leadership from a principal, and how to have this without some conflict with the central office staff is hard to see. Of course, if the director of instruction acts only as a consultant, this is possible, which is one of the reasons why I am one of those who hold that he should have no administrative authority, to return to an earlier argument.

The attempt at a clearer conception of the instructional leader's job is admirable, and the need for clarification of the role is well pointed out. Lest this paper seem unduly critical, let me say that those of us at the University of Utah are looking forward to having Dr. Hass with us next summer.

Sincerely,

Arthur Adkins
Associate Professor of Education
University of Utah
Salt Lake City, Utah

AN ASSURANCE POLICY by Judy

THIS POLICY ASSURES THAT:

Teachers using Judy Materials do a better job in helping children learn because

A. JUDY MATERIALS ALLOW MORE TIME FOR BETTER TEACHING:

1. are ready-made visual manipulative teaching tools
2. provide for many approaches to teaching
3. serve a wide range of individual differences

B. JUDY MATERIALS MAKE LEARNING A LASTING, SATISFYING EXPERIENCE:

1. provide interest, challenge, motivation, enrichment
2. encourage creativity
3. insure good work habits

Write for complete catalog . . . see this policy in action.

THE JUDY COMPANY

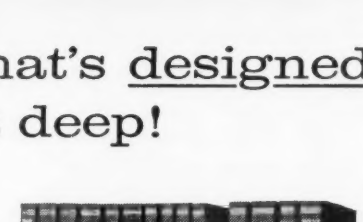
310 N. 2nd St. Dept. EL2 Minneapolis 1, Minn.

The Encyclopaedia that's designed to be 5 grades deep!

Britannica Junior is designed especially to meet the needs of boys and girls at the elementary school level. No attempt is made to cover subjects beyond this level. All material is directed toward the special interests of elementary school children—content is as wide as a fourth grader's curiosity, coverage deep enough for an eighth grader's probing.

Not only is each subject covered more thoroughly, but the vocabulary is kept simple. Each article is more easily understood—more stimulating to young minds. Large type, colorful illustrations, simple diagrams and short sentences are just a few of the features that make Britannica Junior the ideal encyclopaedia for elementary school children.

And, of course, continuous revision keeps Britannica Junior up-to-date in current events and keeps it in step with new methods of teaching.



For free teaching aid, "Learning from Literature," designed to teach the values of literature, write: John R. Rowe, Dept. 406, Encyclopaedia Britannica, 425 N. Michigan Avenue, Chicago 1, Illinois.

Designed especially for unassisted use by elementary school children

Significant Books

Column Editor:
Elizabeth Z. Howard

Contributors:
Margaret Wasson
Marian Jenkins

The General Education Class in the Secondary School. ***Louise E. Hock and Thomas J. Hill.*** *New York: Holt, Rinehart and Winston, Inc., 1960. 232 p.*

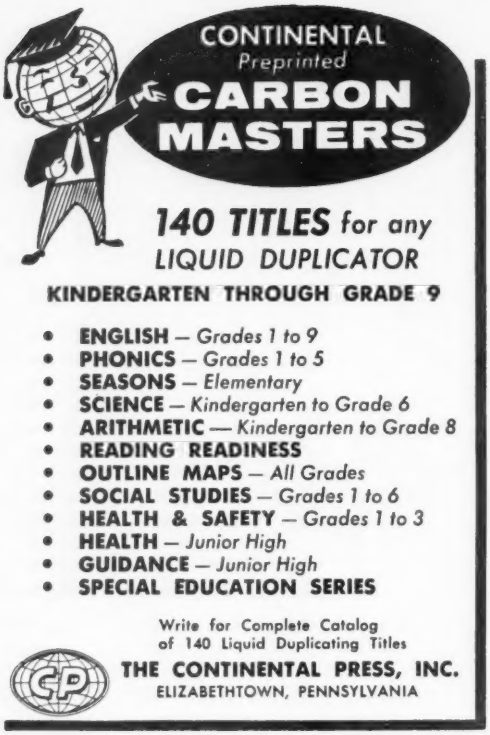
The emphasis in this volume is on accounts of present practice in general education programs in American high schools. The general education class is defined by Hock and Hill as "that block of time in the school day in which those needs, problems, and concerns of our adolescents and our society that are common to all individuals are directly dealt with through a process of co-operative pupil-teacher planning without regard to the usual subject-discipline lines." The purpose of this class: the maximum development of each young person as an intelligent individual in his own right and as a mature citizen in his relationships with his fellow man.

The authors, both veterans of teaching core classes in high schools, have chosen to present very ably the case for such classes. They devote the first fourth of this volume to definition, philosophical bases, and a description of core classes in four school situations: P. K. Yonge Laboratory School, Gainesville, Florida; Evanston Township High School, Illinois; Pennsbury Junior High School, Pennsylvania; and the University School, Ohio State University. A statement of philosophy, an outline of organization, and a typical unit are summarized for each situation. It is convenient to have these well-known programs combined in one chapter for ready reference.

The longest and most important segment of this book is that devoted to teaching in the general education class. Here are found previously unpublished examples from actual practice of effective ways to get started, to use a problem-solving approach, to meet the challenge of individual differences, to develop skills, values and attitudes, and to evaluate growth and progress. Some of these accounts have great interest in themselves. The reader is a bit disappointed when the cut-off point is reached: he would like to know what happened next.

Of value to prospective teachers of core classes are the practical descriptions of ways used by successful teachers to get the class started—developing acquaintance, establishing a friendly atmosphere, sharing, getting down to work, discovering abilities, needs, and interests, identifying problems for study. Two of the most helpful chapters concern problem-solving techniques and ways of meeting individual differences. These two chapters are packed with fresh examples. The vast range of abilities, interests, and needs of a tenth grade class of 36 is vividly shown by the sample class profile included.

In similar fashion the topics of educa-


CONTINENTAL
Preprinted
CARBON
MASTERS
140 TITLES for any
LIQUID DUPLICATOR
KINDERGARTEN THROUGH GRADE 9
• ENGLISH — Grades 1 to 9
• PHONICS — Grades 1 to 5
• SEASONS — Elementary
• SCIENCE — Kindergarten to Grade 6
• ARITHMETIC — Kindergarten to Grade 8
• READING READINESS
• OUTLINE MAPS — All Grades
• SOCIAL STUDIES — Grades 1 to 6
• HEALTH & SAFETY — Grades 1 to 3
• HEALTH — Junior High
• GUIDANCE — Junior High
• SPECIAL EDUCATION SERIES
Write for Complete Catalog
of 140 Liquid Duplicating Titles
THE CONTINENTAL PRESS, INC.
ELIZABETHTOWN, PENNSYLVANIA

tional outcomes and pupil evaluation are analyzed and illustrated by meaty examples.

The final brief section of the volume deals with the future of general education, spelling out implications for teacher education, for curriculum change, and for further expansion of the general education program. The authors point out that this pattern of curriculum design has made definite progress in the past 25 years, with most current core classes clustered in the seventh and eighth grades.

A rather scanty section on research summarizes only studies which support general education—and only those sections of those studies which favor the general education pattern. For instance, the Kelley-Beatty study does show, as Hock and Hill point out, that "through the use of standardized tests . . . general education pupils demonstrated achievement superior to nongeneral education pupils in the areas of language, reading, and arithmetic." But this same study is reported by Alberty in the 1960 *Encyclopedia of Educational Research* as revealing that the control (nongeneral education) group made greater gains in the area of study skills.

The authors conclude with a persuasive passage which underlines the perils and challenges of these times. For them "the focus of the future must inevitably be upon the general education of our people." They predict that specialization will be postponed to post-secondary years; that the content of the secondary curriculum will be more meaningful in terms of current needs and pressures; that education will make more effective use of many disciplines to help people gain wisdom, skills, attitudes, and appreciations needed to attain the goals of democracy and peace; that we are moving toward a greater synthesis of knowledge; that the real revolution in American education is still to come; and that the ideas, if not the class organization, described and expressed in this volume will help to point directions for changes.

A useful bibliography is appended, with about one-third of the references to publications of the past five years.

This book is a workmanlike summation of ideas and beliefs concerning the general education class in high school today. The how-to-do-it section has good ideas for prospective core teachers as well as for seasoned teachers in search of suggestions for ways to improve their work with boys and girls. And the volume will provide the curriculum worker with some succinct facts and concepts with which to resist some of the current pressures to overload the school program with gadgets or with math, science, and foreign languages.

In a word, this is a useful popular treatment of a significant curriculum trend.

—Reviewed by MARGARET WASSON, *Director of Instruction, Highland Park Independent School District, Dallas, Texas.*

The Teaching of Reading. *John J. DeBoer and Martha Dallman.* *New York: Henry Holt and Company, 1960. 356 p.*

The closing paragraph of this new volume by authors well known in education poses clearly the task of education in relation to reading:

> We are a reading nation, despite radio, television, and movies, and the schools must receive chief credit for having made this so. But literacy is not enough. Perhaps the greatest of our tasks is the development of taste and discrimination, not only in the selection of reading materials, but also in the evaluation of what is read. Never before has popular enlightenment been so essential to the welfare of both our own country and our world. Teachers of reading thus have the twofold task of raising the cultural level of a people and of creating the widespread understanding needed to make that culture viable in an age of unexampled peril. To accomplish this task they must themselves be well-read, critically minded participants in the social scene. (p. 356)

Educators will agree heartily. How have the authors implemented this challenge? They have presented the values of reading in our day, summarized efforts to improve reading through the years, suggested the nature of individual differences and the complexity of the reading process. Classrooms of various grade levels which utilize different ways of helping children to learn to read are described. Many chapters are devoted to the details of skill development. These offer help to the teacher and will be a guide to the development of skills.

Introducing

A COMPLETE HEALTH PROGRAM

The NEW ROAD TO HEALTH Series, Grades 1-8

Byrd • Jones • Landis • Morgan • Roberts • Shaw

Outstanding Features:

- Experienced Authorship
- A Total Health Program—Physical, Mental, Emotional and Social Health; and Safety
- Positive Motivation
- Full-size, Full-color Teachers' Editions at each Grade Level

LAIDLAW BROTHERS

Thatcher and Madison — River Forest, Illinois

highly successful texts . . .

EDUCATIONAL IDEALS IN AMERICAN SOCIETY

ROBERT MASON, University of Pittsburgh

Analyzes current educational issues against a background of the history and philosophy of American education. Dr. Mason traces the developments of the various competing proposals for educational policy, and presents a comprehensive, objective evaluation.

SOCIETY AND EDUCATION

ROBERT J. HAVIGHURST and BERNICE L. NEUGARTEN—
both University of Chicago

A sociological approach to education, stressing the role of the school in the social development of the child, and in its relationship to the community. The authors discuss the teacher's crucial position in the interaction of child, school, and society. Other formative influences on the child's growth—family, peer group, community agencies, are covered.

MENTAL HEALTH IN EDUCATION

MERL E. BONNEY, North Texas State College

Emphasizes a **positive, preventive** approach to the mental health of the total child, the class, and the teacher. The author analyzes personality and interpersonal measurements as a basis for understanding pupils and meeting individual differences. Concepts and objectives are effectively defined and applied to encourage a constructive, dynamic practice of mental hygiene.

for further information write to: Arthur B. Conant

ALLYN AND BACON COLLEGE DIVISION

150 TREMONT STREET • BOSTON 11, MASS.

Many readers will respond with satisfaction to the detailed discussions of reading readiness, of prereading and beginning reading experiences, of the use of basal readers, workbooks, etc. Others will be relieved to know of the stress placed on phonetic analysis as an approach to word recognition. Those seeking help for retarded readers will respond to the full suggestions incorporated in various sections. For administrators particularly interested in inaugurating a school-wide reading program there are well organized ideas. The role of the school library and hints as to its organization are timely. Bibliographies, lists of award books, periodicals for children and youth, and suggestions for organizing a book fair, etc., are added helps.

What is the over-all organization through which these ideas circulate? Designed for those in elementary education, this volume has three parts: Part I general introduction, place of reading, development of the child; Part II, "specific reading abilities that need to be cultivated in school"; and Part III, "draws together the specific elements in reading instruction and shows how they function in the program as a whole." Part II is divided in such a way that in chapters marked "A" skills are discussed and in those marked "B" teaching aids for development of these skills are suggested.

This latter feature, the table of contents and the index make it possible to use this book as a ready reference. Its strengths lie in the organization and in the bringing together of information of historical importance and of current trends as well as in offering concrete helps for almost any aspect of the reading process. The authors reveal their practical experience with children, with various types of schools and are clear in their presentation of ideas.

Three to make ready . . .

For the Primary Program

BASIC SOCIAL STUDIES SERIES

DISCUSSION PICTURES

Set of 24 big pictures (22½″ x 30″) presenting situations common to 5- to 7-year-olds. Packaged in tube with hanger for mounting.

BASIC SOCIAL STUDIES 2

Hard-bound text showing phases of community life familiar to children. Designed for Grade 2.

BASIC SOCIAL STUDIES 3

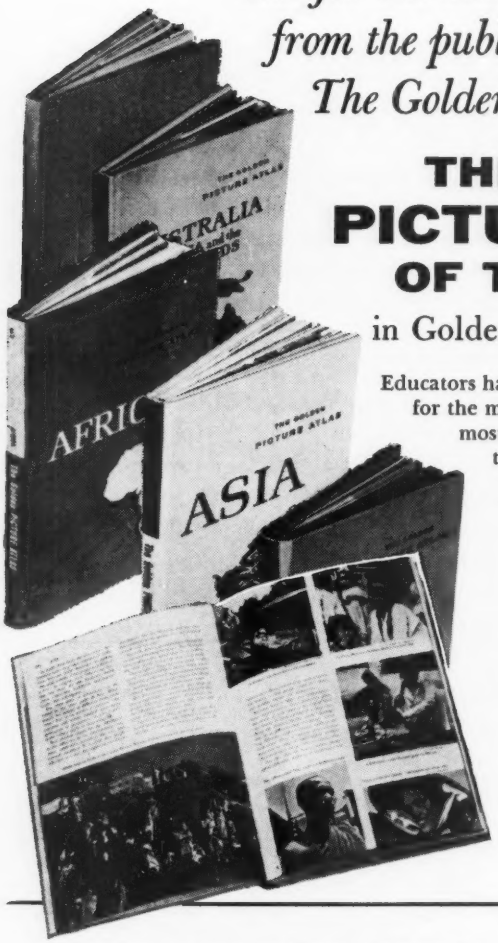
For Grade 3, hard-bound text telling the story of Food, Clothing, and Shelter—where they come from, how they are produced, and how they are transported.

Pupil map-making and map-reading activities developed throughout. Complete Teacher's Editions available.

ROW, PETERSON AND COMPANY

Evanston, Illinois **Elmsford, New York**

Now, another invaluable teaching tool for the elementary grades, from the publishers of The Golden Book Encyclopedia



THE GOLDEN PICTURE ATLAS OF THE WORLD

in Goldencraft Library Binding

Educators have hailed *The Golden Book Encyclopedia* for the magnificent way in which it makes even the most difficult subjects clear to the pupils of the third through the sixth grades. Now Golden Press brings you the first Atlas ever to present a wealth of information about the lands and people of the earth in a manner readily grasped by elementary school children. Illustrated in full color on every page, *The Golden Picture Atlas* is so attractive and easy to use it will make "looking it up" fun and instill the reference habit in the very youngest readers.

• 6 volumes—Vol. I: North America; Vol. II: South America; Vol. III: Europe; Vol. IV: Asia; Vol. V: Africa; Vol. VI: Australia, Oceania, the Polar Lands • Fully indexed • Net price $14.95

THE GOLDEN BOOK ENCYCLOPEDIA

in Goldencraft Library Binding

"Will be an inspiration to teachers and librarians, as well as to children. It will aid them immeasurably in presenting units on the use of the encyclopedia and in correlation with Science, Social Studies and Language Arts."
—*Margaret S. Sandine, Head, Materials Center,* CHICAGO TEACHERS COLLEGE

• 8 volumes, 192 pages each
• Fully indexed in final volume
• Full-color illustrations on each page
• Net price $39.50

Write for a complete list of Golden Books in Goldencraft Library Binding

GOLDEN PRESS, INC., Educational Division, 630 Fifth Avenue, New York 20, N.Y.

While one acknowledges these practical aspects of the presentation, this reviewer wishes that the ringing challenge stated so well above had led the authors to discuss reading from a much broader viewpoint. The demands on education these days are for more than maintaining what we have accomplished. We are called upon to devise and create new and better ways, to activate theories long accepted yet never really put into practice on a large scale, and to accept findings in research not labeled "reading." For instance, in discussing the nature of reading, the knowledge regarding perception (Allport, Combs, Mooney, etc.) needs to be interpreted for teachers of reading. What is the relationship to reading of the knowledge that we each see concrete objects in different ways? That we interpret situations and experiences in ways unique to the individual? What meanings are brought to the printed page by deprived children, those with top-notch ability in the language area and those who are able in other areas than language-reading?

In discussing retarded readers, reference is made to children reading above or below grade level and "average for their age group." The vital consideration here is a matter of the subjects' intellectual capacity. Every normal class of children has a wide spread of abilities, as recognized by the authors, hence "grade level" or "average" is *not* a functional idea, but the individual's capacity and how nearly he is reaching it *is*.

This reviewer misses extended discussion of newer approaches, including the work of Willard Olson at the University of Michigan in "self-selection," that of Alvina Treut Burrows, New York University, and R. Van Allen of San Diego County Schools in helping children through their own writing to learn to read the printed word, of the New York City Schools in recent research on vocabulary in various series of readers and in the individualizing of reading.

The broad approach promulgated in the Claremont College Reading Conferences is mentioned yet not accepted as practical. However, these ideas have been widely accepted for many years and the practices of hundreds of teachers have improved as a result.

Some definitions of reading, however, are perhaps too broad. The Claremont College (California) conferences on reading include all perceptive observation of the real world around us. In this sense, reading becomes synonymous with education itself. While such a definition is justifiable if its terms are made sufficiently explicit, we must admit that most people today do not attach similar connotation to the word "reading." In this book we shall think of reading as an activity which involves the comprehension and interpretation of ideas symbolized by written or printed language. (p. 19)

It is, of course, the privilege of authors to define their own purposes, yet from Dr. DeBoer and Dr. Dallman one has come to expect support for sound ideas whether "most people" at the moment accept them or not. We look to them to lead teachers on to new ventures and to inventive approaches to teaching based on theories long accepted—for instance, "self-selection" as a principle of learning. Here we need the thoughts of such scholars as these authors to enable us to formulate effective practices.

In the preface the authors state that one of their purposes is "to encourage experimentation." This purpose is not accomplished to the degree that one would hope. What appears to be a rather limited approach to reading readiness and prereading experiences lessens the opportunity for helping children to ap-

Now available—

Human Variability and Learning

Price $1.50

"Individual differences" are treated in this latest addition to the ASCD "learning" series. Edited by Walter B. Waetjen, this booklet brings up to date the results of two Curriculum Research Institutes on this topic. Preceding booklets in this series are:

Learning More About Learning

Price $1.00

Freeing Capacity To Learn

Price $1.00

Order these from:

ASCD, NEA
1201 - 16th Street, N.W.
Washington 6, D.C.

proach print through their own writing and a continued individualized approach. The use of series of readers as suggested leaves much to be desired when one considers the limitations of vocabulary in the primary books of most series and the large vocabulary which many children understand and use in speaking and with little trouble come to recognize in print. What of the many children who need only a few hints regarding phonetic and structural analysis to be able to move quickly into independence in word recognition? Extended instruction in word analysis appears to be unnecessary for many learners. This is closely related to the use of workbooks which, if they are to serve functionally, should be used with the greatest discrimination. How much more effective it is to encourage children to continue to read or to write when working independently of the teacher, rather than to do repetitive and often stereotyped "seatwork"!

In an era of education which supports programs for the gifted, the mentally retarded, the deaf, the visually and neurologically handicapped, etc.—that is, supports the idea of individual differences almost to the *n*th degree—there is dire need for more definitive professional material on individualizing in relation to all learning.

Particularly helpful and appreciated will be the sections on analyzing and cultivating children's interests (Chapters 11A and 11B). The great variety of exposures children are subject to in the mass media of communication is recognized. Teachers and parents will respond favorably to the presentation here. The role of parents in creating a setting for success in reading is analyzed in a most helpful manner (p. 345).

In the section "The Reading Program in Action" (primary and intermediate grades), every teacher will find encouragement as he seeks to improve planning for his class which will lead to satisfactions in reading for all learners. Especially suggestive is the discussion of problems of reading in various curriculum areas. References at the close of each chapter are worth pursuing as some of the newest material is included (Lazar, Miel, Veatch, etc.).

The reviewer urges that the many admirers of the authors read the book and make their own analysis of its values.

—*Reviewed by* MARIAN JENKINS, *Consultant in Elementary Education, Los Angeles County Schools, California.*

Balance in the Curriculum

ASCD 1961 Yearbook

This volume, prepared by the ASCD 1961 Yearbook Committee, Paul M. Halverson, Chairman—

Explores various dimensions of balance as it relates to curriculum development

Expands the definition of curriculum for purposes of discussing curriculum balance

Delineates the relationships in curriculum development processes that are crucial to balance in the school program

Helps the reader find himself and his position in relation to balance in the curriculum.

Chapters

The Meaning of Balance
Curriculum Balance in the Current Social Scene
Values in Curriculum Decision Making
Balance and the Problem of Purpose in Education
Balance in Teaching Methods and Learning Processes
Balance and the Selection of Content
Problems in Organizing the School Program To Achieve Balance
Balancing the Roles in Curriculum Decision Making

Pages 194 Price $4.00

Order from:

Association for Supervision and Curriculum Development, NEA
1201 Sixteenth Street, N.W., Washington 6, D.C.

Register now for the

1961 ASCD Conference
Chicago, Illinois

March 12-16, 1961

Headquarters Hotel: Conrad Hilton

"Curriculum Frontiers in the '60's

DETROIT PUBLIC LIBRARY
PHILOSOPHY, RELIGION & EDUC., PI
5201 WOODWARD AVE.,
DETROIT 2, MICH.

General Sessions

speakers: Arthur W. Foshay, Theodore Kreps, James B. Conant, James H. Robinson

Assemblies

panels discuss topics of general interest

Job-Alike Groups

people with similar positions meet together

Area Meetings

presentations are made in areas related to the conference theme

Discussion Groups

specialized topics within the above areas are considered in small groups.

Complete information available from:

Association for Supervision and Curriculum Development, NEA

1201 Sixteenth Street, N.W., Washington 6, D. C.